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Contents.

PAGE

The Battle of Romani. By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O., ... 1

The Air Requirements of the Army. A Lecture delivered at the Royal Artillery Institution, Thursday, 21st October, 1924. By Major-General Sir W. E. Ironside, K.C.B., C.M.G., D.S.O. 18

The Evolution of Artillery in the Great War. By Bt. Lieut.-Col. A. F. Brooke, D.S.O., *p.s.c.*, R.A. 37

Artillery Tactical Problems. By Bt. Lieut.-Colonel E. C. Anstey, D.S.O., R.A. 52

Pack Artillery—Present and Future. By Captain H. M. J. McIntyre, R.A. 66

The Employment of Mechanical Transport by Territorial Medium Artillery. By Lieut.-Colonel (Bt.-Col.) Edward V. Hemelryk, D.S.O., T.D. 87

The Imperial Nerves and Arteries. By Lieut. G. L. Appleton, R.A. 92

A Battery Commander's Wagon. By Lieut. R. A. King, R.A. ... 110

An Instructional Model. By Captain R. Blewitt, D.S.O., R.A. (T.A.) 116

Intercepted Conversation. (With Apologies to the Quarterly Artillery Summary.) 118

Sport in India. Communicated by Major-General E. H. Willis, C.B., C.M.G. 122

An Inexpensive Fishing Trip in India. By Captain A. Veitch, R.A. 144

XLI R.F.A. Wednesday, 11th November, 1914. With two Maps. By Major A. F. Becke, late R.F.A. 149

Pack or Single Draught. By Colonel C. De Sausmarez, C.B., C.M.G., D.S.O. 182

Close Support Artillery. By "Pompey" 193

F.S.R. Vol. II, 1924, on the Employment of Artillery. By Major H. R. Pownall, D.S.O., M.C., R.A. 210

The Problem of the Tank. A Lecture delivered at the Royal Artillery Institution, Woolwich, on Tuesday, 18th November, 1924. By Lieut.-Colonel F. A. Pile, D.S.O., M.C., Royal Tank Corps 217

The Rôle of Forward Troops in the Collection of Intelligence in the Field. A Lecture delivered at the Royal Artillery Institution, Woolwich, on Tuesday, 9th December, 1924. By Major-General Sir William Thwaites, K.C.M.G., C.B. 235

Artillery Tactics. By Lieut.-Colonel A. A. Goschen, D.S.O., R.A. ... 254

Tanks in Rear Guard Operations. By Colonel J. F. C. Fuller, D.S.O. 261

Mount Everest, 1924. By Lieut.-Colonel E. F. Norton, D.S.O., M.C., R.A. 270

Early Days in Rajputana. By "O. B. E." 291

The Kadir Cup Meeting, 1925. By "Nemo" 296

Note on Frontispiece 305

"Duncan" Silver Medal Essay, 1924-25. The Supply, Training and Organisation of Technical Specialists. By Colonel (temp. Col. Comdt.) M. L. Wilkinson. "Arte et marte" 307

Digitized by Google

PAGE

"Duncan" Highly Commended Essays, 1924-25 :

Anti-Aircraft Artillery. Where it now stands and how it should be used, with particular reference to Moving Warfare. By Captain K. M. Loch, M.C., R.A. "Sic itur ad astra" 320

The Effect of Tactics on the Organisation and Command of Artillery. By Bt. Lt.-Col. H. W. Wynter, D.S.O., R.H.A. "C'est avec l'artillerie qu'on fait la guerre" *(Napoleon)* 341

The Pack Gun in Mountain Warfare. By Colonel H. Rowan-Robinson, C.M.G., D.S.O. 365

The Evolution of Artillery in the Great War. IV.—The Evolution of Artillery Organisation and Command. By Major (Bt. Lt.-Col.) A. F. Brooke, D.S.O., *p.s.c.*, R.A. 369

Some Problems of Territorial Field Artillery. By Major R. A. E. Voysey, R.A. (T.A.) 388

Artillery Brigade Tactical Exercises. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. 396

The Staff Officer in the Air. A Reply to "Artillery Command from the Air." By Lieut.-Colonel F. A. Pile, D.S.O., M.C., Royal Tank Corps 417

A Marching Problem. By Lieut. G. L. Appleton, R.A. 421

Our Cannon at the Battle of Cressy, 1346. By Lieut.-Colonel H. W. L. Hime, R.A. (Retired) 425

An Act of International Friendship. San Sebastian, 28th September, 1924. By Major-General J. C. Dalton, Colonel Commandant, R.A. 428

Tiger Shooting in Assam. By Captain P. J. K. Warren, R.A. 431

Home—by the Overland Route. By Colonel H. Rowan-Robinson, C.M.G., D.S.O. 443

On Ottoman Subjects. By Lieut.-Colonel C. B. Thackeray, D.S.O. ... 453

Royal Artillery War Memorial. Unveiling and Dedication Ceremony. By Major-Genl. Sir Stanley von Donop, K.C.B., K.C.M.G., Colonel Commandant, R.A. 465

"Duncan" Essay, 1924-25. Counter-Battery Work in Mobile Warfare. By Captain R. H. A. Kellie, M.C., R.A. "Bis dat qui cito dat." 490

The Stand at Le Cateau, 26th August, 1914. By Brig.-General C. De Sausmarez, C.B., C.M.G., D.S.O. 510

Artillery Brigade Tactical Exercises. By Bt. Lieut.-Colonel E. C. Anstey, D.S.O., R.A. 524

Royal Air Force and Army Co-operation. By Major R. G. Cherry, M.C., R.A. 548

The Bombay Horse Artillery in Persia, and the Mutiny, 1857-59. With a photograph of the survivors of the Officers of the Fourth Troop taken in 1911. By Major-General J. C. Dalton, Colonel Commandant, R.A. 556

The Story of the Sikhs and the recent troubles. By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O. 561

"There is a Happy Land . . . ." By Lieut. H. W. Fane, late R.A. 585

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Illustrations.

		PAGE
Illustration.	Gun of 59th (4th W. Lancs.) Brigade with Fordson Tractor ... ...Frontispiece	1
Map	... ...(Inserted) To face page	7
Map	... ... ,, ,,	16
Appendix D.1. and D.2.	... ... ,, ,,	42
Map	... ... ,, ,,	56
Illustrations of a Model Battery	... ...(Inserted) pages 116 and	117
Illustration.	Delhi Tent Club. Xmas, 1924 ... ...Facing	131
,,	Casualties on both sides ... ... ,,	132
,,	The Dining Room, R.A. Mess, Woolwich ,,	149
Sketch.	Rough Plan of strong point	178
Illustration.	The Battlefield, 11.XI.1914 ... ...Facing	178
Maps. Ypres 1 and 2	... ...(Inserted) To face page	180
Illustration.	The Base Camp and Mt. Everest ... ...Facing	270
,,	The North Col from Camp III. ... ... ,,	277
,,	Camp IV. Looking North ... ... ,,	282
,,	Nearing the highest point reached by the non-oxygen party ... ... ,,	286
,,	Group at Base Camp ... ... ,,	290
,,	The last two Sahibs move slowly off ... ,,	290
,,	The flag elephant ... ... ,,	296
,,	The line of elephants with syces leading horses behind ... ... ,,	300
,,	Royal Tournament, 1925. Officers of the "Trayne of Artillerie" ... ... ,,	307
Diagrams.	Appendix "F" and "G" ... ...Inserted page	386
Map	... ... ,,	416
Illustration.	The Queen of Spain unveiling the Memorial ... ...Facing	429
,,	Group including Queen of Spain and others ... ... ,,	430
,,	The nine skins ... ... ,,	431
,,	The first day's bag ... ... ,,	435
,,	A crowd of villagers soon gathered round ,,	439
,,	One of the first victims ... ... ,,	441
,,	General view of the Ceremony ... ... ,,	465
,,	General Sir Leslie Rundle inviting Field Marshal H.R.H. The Duke of Connaught to Unveil the Memorial ... ,,	467
,,	The Dedication by the Chaplain General (seen from the south end) ... ... ,,	470

Digitized by Google

		PAGE
Illustration.	The Dedication by the Chaplain General (seen from the west side) ... ...Facing	473
,,	General Lord Horne depositing a Wreath on behalf of all ranks of the Regiment ,,	475
,,	General Sir George Milne depositing a Wreath on behalf of the Regiment in Memory of the Artilleries of the Great Overseas Dominions ... ... ,,	477
,,	The Officers of B. Battery, 4th Brigade, Royal Artillery, in 1868 ... ... ,,	481
,,	General view of the crowd at Hyde Park Corner ... ... ,,	483
Map	... ...Inserted page	522
Illustration.	Officer Bombay Horse Artillery, 1846 ...Facing	556
,,	Photograph of the survivors of the Officers of the Fourth Troop, Bombay Horse Artillery, taken in 1911 ... ... ,,	559

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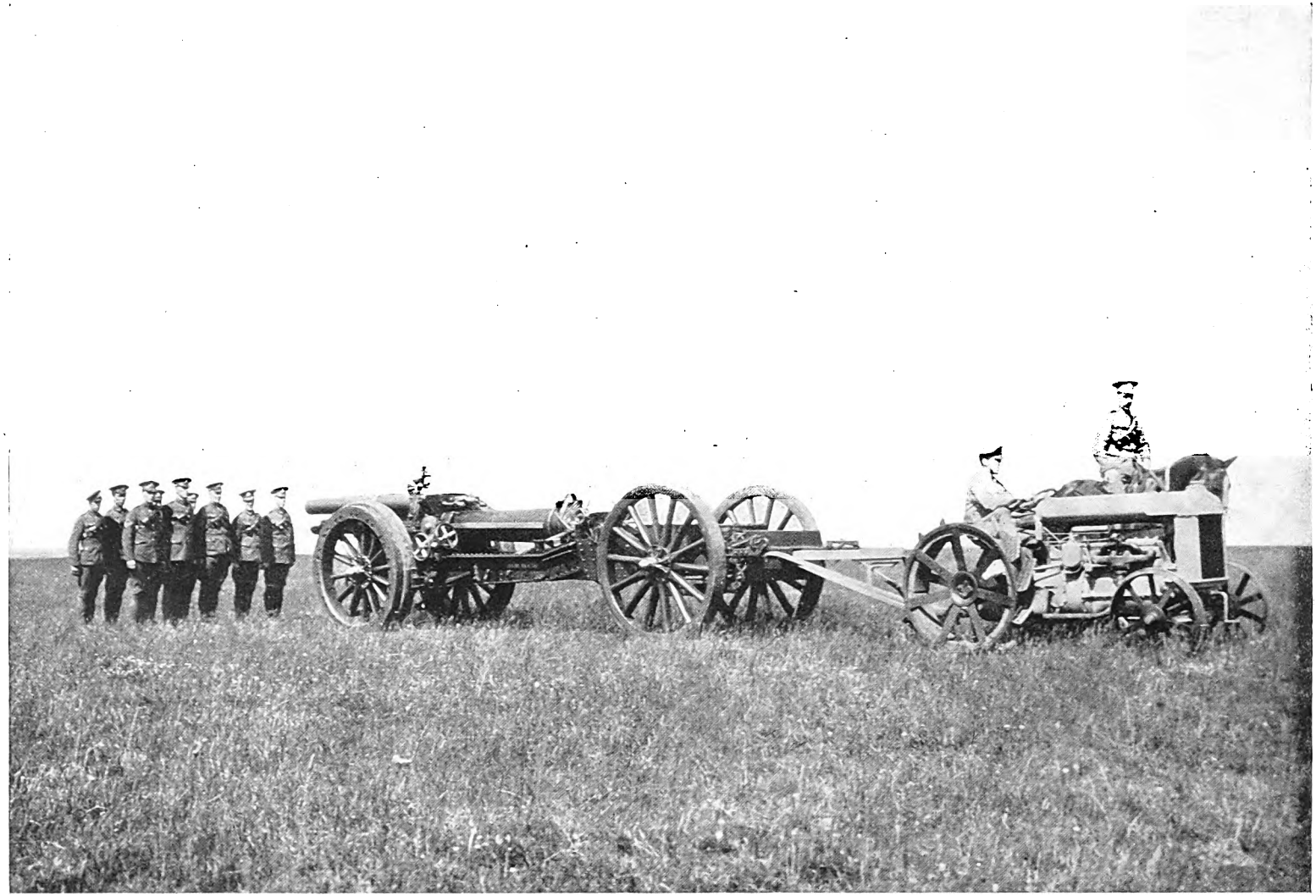

GUN OF 59th (4th W. LANCS.) BRIGADE WITH FORDSON TRACTOR.

[See p. 87.

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Vol. LI. No. 6. Errata.

Page 333. Line 14 from *bottom* of page, for "C.R.A." read "C.R.E."

Page 339. Line 15 from *top* of page, for "H. T. Phillpotts" read "A. T. Phillpotts."

Page 407. Column 4. Award. Greene, W. After "Medal" omit "(n)."

Page 408. Footnote "b" should be "c." and footnote "c." should be "b."

Page 408. Column 4. W. Cator. Add "18.22.24."

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THE BATTLE OF ROMANI.

By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O.

1. The Sinai Defences.
2. The occupation of Qatia.
3. The commencement of the railway to Palestine.
4. The position at Romani.
5. The Turkish Forces.
6. The approach of the Turks.
7. The Battle of Romani.
8. The morning of August 5th.
9. The 6th and 7th of August.
10. The end of the pursuit.
11. Comments on the Battle.

Maps.

1. Sketch of Romani Battlefield.
2. The Oases.

The Sinai Defences.

AMIDST the clash of the great battles of Europe, the story of the hard-fought battle of Romani on the fringe of the Desert of Sinai received but little public attention and is little known of. Yet it was fought by a considerable force, in the most intense heat, and on one of the most historic sites in the world. Even those who know of it, other than the army immediately concerned, hardly know how or why it was fought. Yet now that the great war has come and gone, even if humanity can eliminate the clash of nations, war in the form that is known to the British Army is likely to remain. It has been our lot for a couple of centuries to make the world safe for the world's trade and there seems every prospect that we shall have to continue to do so. And that duty will always involve our small professional army in fighting smaller wars with half civilized folk, who would disrupt the daily scheme of things. The battle of Romani is the type of battle, not in its tactical detail, but in its general setting, that may easily come to us again. In any case the story of it is well worthy of attention.

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It came about in this wise. The Suez Canal is or was during the war the Spine of the British Empire, as a German strategian termed it. Its protection from attack was one of our first cares, and after our wont we called in the Indian Army to undertake that duty in the beginning. So long as Turkey remained out of the war, the Canal was chiefly in danger from acts of sabotage, and at its extremities. But since no man knew at what moment Turkey would be cozened into joining the Central Powers, its protection from the Sinai side was always a problem. In fact in February 1915 some 20,000 men were brought against the Indian defenders and failed. The attack on the Dardanelles for the time diverted the main energy of the Turks, but with the evacuation of the Gallipoli Peninsula they were free to carry out what would have been an extremely embarrassing blow to the Allies, the seizure or destruction of the waterway of the Canal. The matter caused the greatest anxiety in the War Cabinet when the evacuation of Gallipoli was being discussed, and Lord Kitchener himself paid great attention to it on his visit to the Dardanelles and the Levant in the autumn of 1915. It was agreed on that an attack in force on the Canal was bound to come and that the Turco-German direction was planning it.

There were only two alternatives, an attack on Turkey elsewhere or a passive (for the time being) defence of the Canal. Here Lord Kitchener stepped in. If we defended the Canal again it must be something more effective than using the Canal bank as our rampart, which scarcity of troops had in the earlier days alone permitted. A great defensive line well manned and entrenched must be found that would keep enemy guns out of range. The only alternative to this form of defence was a landing at Alexandretta, and there were many reasons that prevented that. Among others it was slowly dawning on military minds, only slowly for it was a point the military mind had loved to ignore, that a modern army cannot succeed unless it can secure a port at which its maintenance stores can be landed. Gallipoli had shown us the extreme folly of the open beach, and that an army can expect nothing that way. It is to be hoped that it will not be forgotten. Further it was realized that the Gallipoli troops were down and out for the moment in health and equipments, and were not organized as a field army.

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It was therefore definitely decided to entrench thoroughly a position some miles east of the canal, General Horne was detailed to select the line to be held, and the whole engineering resources of Egypt were mobilized by Sir John Maxwell to carry out the work. It entailed immense undertakings. The line lay some ten or eleven miles east of the Canal, and there was no water, no road for any purpose. It was necessary every ten or twelve miles, in a line close on a hundred miles long, to make a light rail, a metalled road and a pipe line, to carry water and supplies to the troops who were to entrench and occupy the line. The water came from the Nile in the foul "Sweet-Water" Canal, and had to be filtered and then syphoned across the Canal and pumped onwards. As the trench line was largely dug in sand, immense quantities of revetting material was required and fleets of *dahabiehs* carried stores, hurdles, matting, etc., along the Canal to the various base stations.

The divisions as they arrived from Gallipoli were moved to the Canal banks, and to the dysentery-worn trench-weary troops of the Peninsula, trench-making unmolested with plenty of food and comforts in the splendid winter climate of Sinai was exactly what they required. The hotch potch of equipments that came away with them were being sorted out and the units were gradually being reformed into an army. It is interesting to realize the enormous force which was then present in Egypt. Sir William Robertson had wired to say that it was to be regarded as an "Imperial Reserve," and the divisions surplus to local needs would be switched to other theatres of war. As a matter of fact all except the 52nd, 53rd and 54th Divisions eventually went to France, and the 13th which went to Mesopotamia under Sir Stanley Maude.

On the Canal or in Egypt after the evacuation of Cape Helles were 12 Divisions, besides many mounted brigades, the divisions being the 11th, 13th, 29th, 31st, 42nd, 52nd, 53rd, 54th, and the 1st, 2nd, 4th and 5th Australian or Anzac Divisions. It was indeed an Imperial Reserve, and by the end of May, only three remained besides the host of mounted troops.

The Occupation of Qatia and Romani.

Since the immediate threat to the Canal had been warded off, the divisions perforce were whisked off elsewhere. Some day,

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someone will write the story of this wonderful amphibious Empire that threw its divisions from sea to sea. There were 13 on the Gallipoli Peninsula. There were 7 in Mesopotamia as well as a cavalry division, there were several in Salonika, there were many more brought back for Lord Allenby's campaign. It is a story, an epic, in itself, especially when viewed from an armchair or from the Council table.

Now Sir Archibald Murray who commanded the Mediterranean Expeditionary Force (afterwards called the Egyptian Expeditionary Force), was by no means enamoured of the passive defence of the Canal, though he recognized that it was the only immediate course possible, that the Turk might attack at any moment, and that neither his troops themselves nor their equipments were fit for any other duty. But it seemed to him that the only real defence of Egypt, a defence too that made a change to the offensive possible, was to occupy the water-bearing country through which alone the Turks could as yet make a serious advance. If it was denied them they could not approach. So the whole of his policy was to develop this line and remove troops from the Canal trenches. But the water even here was bad for troops and only usable by such hardy troops as the Turks. To take a big force there meant a pipe line and a standard guage railway line.

If you glance at the map of Egypt you will see that the mouths of the Nile have a wide delta and enter the sea through lagoons which lie to the westward of the Suez Canal. The map shows similar lagoons eastward of the Canal, but with no branch of the Nile running to them. It was out through these eastern lagoons that the old Pelusiac channel of the Nile ran, on which stood Pelusium, and this delta was as thickly occupied and as highly cultivated as the present western delta. It was up the Pelusiac branch of the Nile that Cleopatra sped away in her light draft boats, to escape from Anthony, whose larger sea-going vessels could not follow her in the direction of the western channels of the Nile. Round Pelusium had risen a great Greek and Roman civilization, and the ruins and the remnants thereof stand in the desert to this day. Smothered as the district now is with the drifting sand, it is covered by many small palm groves and brackish wells in the terrain that used to be watered by the Nile. The old channel is to be seen

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clearly with both its banks remaining, for many miles and it is crossed by the Suez Canal at El Qantara (The Bridge) where from the earliest times travellers between Egypt and Syria crossed the river.

The Commencement of the Railway to Palestine.

It was these water-bearing palm grove areas that it was Sir Archibald Murray's intention to deny to the Turk. But it was not possible to put any troops out till water and rail lines had begun to move forward, and till some form of land transport had been reorganized and equipped. At that time camels were a difficulty, since for two years the desert sources of supply had been closed and the camel of the Delta is little fitted for work on the desert.

By the first week in April the 5th Mounted Brigade had been pushed out to Qatia, and were distributed in that area, at Oghratina, Romani and Bir El Hamizah, generally covering the railhead works and developing the water supply. Against this force the German commander of the Sinai force who as principal staff officer to Djemal had planned the attack across mid-Sinai in February '15, launched a sudden well-engineered raid. Just before dawn on the 23rd in a white sea fog he practically rushed the squadrons at Oghratina and then passed on to Qatia itself and attacked the squadron and details which were re-inforced by a squadron from Bir El Hamizah, but they were all destroyed or captured. By this time some assistance had arrived and the rest were extricated with the loss of the best part of four squadrons. During this attack another party of Turks had made for Dueidar a post covering the railway line some 12 miles out from Qantara on the canal bank. This post was alert and had stood to arms at early dawn in the ordinary course of routine, and held their own desperately till the Turk finally made off. The raid was extremely good soldiering on the part of the Turks who had come a long distance. It was a slap in the face for which no one was to blame, and Sir Archibald Murray could only push his railway and pipe line without which it would be quite impossible to keep any force of size in the desert. Unfortunately the pipes had to come from England and America and run the gauntlet of submarines in the Mediterranean. However at last despite the intense heat, the line reached Romani,

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and was joined with a 2′ 6″ line which had been run out from Port Said along the shore to Mahamdiya.

The Position at Romani.

By the 18th of June this light rail had arrived at Mahamdiya and was in working order, while the main line from Qantara (standard gauge) had reached Romani, and the earthwork was started to connect Romani and Mahamdiya by the standard gauge. A 6″ pipe line, converted later to 12″, was bringing up Nile water. Troops in some force could now be maintained on this front and a defensive position was prepared from which the further advance towards the Turkish force at El Arish could be steadily developed.

The command on this front of the Canal defences had been for some time in the hands of Lieut.-General Horne (Lord Horne) who was commanding the XV Corps, but a little earlier he and most of his troops had been sent to France, and Major-General the Hon. H. Lawrence who had commanded the 52nd Division had taken over the command of what was known as No. 3 Section Canal Defences. His troops were the 52nd Division, the 5th Mounted Brigade (Yeomanry) and the Anzac mounted troops (2 Brigades) commanded by Major-General Chauvel, and two other Dominion Brigades, the 3rd Australian Light Horse Brigade and the New Zealand Mounted Rifles employed as Section Mounted Troops.

The position at Romani as will be seen from the sketch map, ran north and south along a line of sand dunes, on the southern extremity of which was a very big dune 100 ft. high, known as Katib Ganet. From Mahamdiya to Katib Ganet the defence consisted of eleven strong fortified posts, containing from 40 to 170 rifles when fully held, with an average of two Vickers machine guns per post, as well as Lewis guns. But practically no wire was available for the intervals. From Katib Ganet 7 more posts of similar type faced south or curled round to the right to cover railhead at Romani. It was not possible to bring up much artillery, as the horses could not yet be watered in any number, while the wheels of many batteries had not been adapted to movement on the shifting sand. An 18pr. battery of the 260th Brigade was in position close to the railhead by the shore at Mahamdiya, and two 18pr. batteries (260th Brigade) were posted south of the railway line. Two howitzer batteries

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(262nd Brigade) with one 18pr. battery (260th Brigade) were on the right in the bend of the hook. Two 60prs. were also posted near the railway line, in the centre. The Ayr and Somerset batteries R.H.A., (T.F.) were with the Anzac Brigades.

THE TURKISH FORCES.

The Battle of Romani is the name given to the determined and well-organized attack by a large Turkish force on the British position at Romani, and before describing it, it will be as well to examine what the Turkish forces and resources were. Since the attack on the Canal in February 1915, the German and Turkish reports had constantly referred to the big plans that Enver was making for another and more powerful offensive, especially since the evacuation of Gallipoli had released so many Turkish troops. The plan now being pushed forward was a railway line right across Sinai from Beersheba which was to develop a great artillery position opposite Qantara, to dominate the waterway. With this object part of the Jaffa-Jerusalem railway had been pulled up and a line made from Nablus, to which point a railway from Damascus had reached before the war, along the Plain of Sharon and the Maritime Plain through Beersheba to El Auja. Beersheba was the principal advanced base of the Turkish troops, and from it detachments had occupied the Egyptian town of El Arish close to the Turco-Egyptian frontier. Troops from the Beersheba railway line had marched over the desert and maintained a line of outposts watching the British and from here the raid on Qatia had been launched.

A German detachment for the reinforcement of the Turks had recently arrived complete in those units which the Turks were weakest in. This contingent was known as Pasha I, subsequent repetitions being known as Pasha II and so forth. Pasha I consisted of a machine gun battalion, anti-aircraft groups, 2 trench mortar companies, a battalion of heavy artillery, wireless, railway companies, lorry companies, field hospitals, and the like. It was a very great asset to the Turks. The attack on Romani was carried out by a first class Anatolian Turk division of the 31st, 32nd and 39th regiments, and the whole of Pasha I except the heavy artillery. Kress von Kressenstein who had been given command of the Sinai force as a first class fighting man, was in command.

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The Approach of the Turks.

May, June and July had been intensely hot in the desert camps, and the troops in the Romani position were largely denied the luxury of bathing which could be enjoyed on the Canal or on the northern coast. It was inexpressibly dreary, and military excitement also seemed far away. A sudden change however was to come over this attitude, for on the 19th July, Brig.-General Chaytor, commanding the New Zealand Mounted Brigade, had flown over the desert on a reconnaissance, and discovered that at least 2500 Turks had occupied Hod El Bayud, and that a somewhat smaller force was at Jameil. On the more northerly route troops were also moving. A somewhat similar force seemed to be at Bir El Abd, where tents were visible. Some 6000 camels were also to be seen at the camps or on the Abd—Salmana road. This obviously denoted the sudden advance of large forces.

By the next day another forward move had taken place and about 3000 men were seen to be entrenched at Mageibra. By the 21st some 2000 were at Oghratina. As soon as G.H.Q. received Brig.-General Chaytor's report, steps were taken to reinforce General Lawrence. Two battalions of the 42nd Division were moved to Qantara and the 158th Brigade (53rd Division) was pushed up to the 52nd position at Romani. General Lawrence had indeed been anxious for some time and had calculated that an offensive stroke was quite feasible. Brig.-General Street, R.A. (killed in France), who at that time was B.G.G.S. to General Lawrence, was especially apprehensive and on the alert.

On the 22nd the main position was held by the 52nd Division and 158th Brigade. The 155th Brigade on the right, 158th centre, 157th the northern portion to the sea. The 156th and 1 battalion 158th were in reserve at Romani.

The 1st and 2nd Australian Light Horse Brigades under General Chauvel were also at Romani. At *Dueidar* were the 5th Australian Light Horse and some infantry detachments. At *Hill 70* the New Zealand Mounted Brigade (less the Wellington Rifles[1]). The water scarcity prevented any more reinforcements being sent up, but it was possible to improve the rifle power without adding much to the

[1] Temporarily attached to the 2nd Australian Brigade.

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drinking strength by moving up the machine gun companies of the 53rd and 54th Divisions. On the right flank in rear of Katib Ganet were a series of long parallel sand dunes, running south-east and north-west between which access could be had to the rear of the British position. These lay south-west of the rounded defensive flank already referred to, and were left unfortified as a suitable ground on which to fight an open fight with the mounted troops if as was anticipated the Turks tried to envelop the British right rear. So certain did it seem that they must attack this way only, rather than against the eastern front of the position, that arrangements were made to counter-attack them when their attack was launched.

From the 23rd to the 28th the Turks gave no sign. They were evidently completing their arrangements especially their water supply. So long did they hang fire that Sir Archibald Murray had made plans to strike himself. On the 28th however the enemy had pushed forward a detachment as far as the Hod Ugba, which was attacked and ejected with loss by the Wellington Mounted Rifles.

The daily routine of the mounted corps between the 20th of July and the 4th of August is worth noting. Every morning at 2 a.m. one of the two brigades marched out of camp in the direction of the morning star, and after traversing a few miles bivouacked till dawn. The brigade then advanced on a wide front till it drew fire. If the Turks were weak it drove them in, if in strength the brigade retired slowly. At nightfall it would return to Romani, the other brigade taking up the duty next morning, carrying out the same operation.

THE BATTLE OF ROMANI.

The advance into the Hod Um Ugba that the New Zealanders had disturbed, proved however to be the commencement of the definite Turkish offensive. By the 29th they were found to have advanced to a line Sabkhat-El-Amiya—Um Ugba—Ayish—Abu Darem—Badied—Hill 200.[1] It appeared that the rear echelons had been closing up, which had caused the delay. This delay however had certainly allowed the British to bring up all the reinforcements they wanted and to perfect their arrangements. By the 3rd of August

[1] East of the map.

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the Turks had moved their line much closer in and contact was now imminent. Anticipating as has been said an attack on our right in rear even of the defended flank, General Chauvel had selected a position some four miles long, running from Katib Ganet to Bir El Enna with a second position in rear, which denied access to the rear by the parallel gullies referred to. Thus on the right rear the mounted troops were echeloned for the counter-attack on the evening of August 3rd.

(i) In rear of the Katib Ganet flank, the 1st Light Horse Brigade with the 2nd, which had just come in from reconnaissance in rear.

(ii) Reserve at Romani.

(iii) At Dueidar the 5th Australian Light Horse.

(iv) At Hill 70 the 5th Mounted Brigade, and the N.Z. Mounted Rifle Brigade.

(v) The 3rd Light Horse Brigade at the Ballah railhead.

(vi) The Imperial Camel Corps and three squadrons at the end of the El Fardan railhead.

The night of the 3rd was warm and moonlit with something of a haze, which owing to the shimmer of the sand did not prevent observation of anything moving near the outposts. As usual on the desert the intense heat of the afternoon had died away into a pleasant restful temperature, and the inclination was more to sleep than to fight. Just before midnight however, the long picquet line of the 1st and second Regiments of the first Australian Light Horse Brigade who had only been put out as dusk across the parallel dune line, and who were very much on the *qui vive,* discerned large bodies of the enemy on their front. It afterwards transpired that these troops had followed the 2nd Australian Brigade in their usual evening retirement and had hoped to pass through the sand dune gullies close on their heels. In rear of the gullies was a ridge facing south called Wellington Ridge. Fortunately the occupation of the reconnoitred line at dusk by General Chauvel defeated the Turkish design of creeping through unobserved in rear of the retiring reconnaissance. It may here be observed that this sort of happening is always the danger in a daily routine such as that described.

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As soon as Colonel Meredith who commanded the 1st Brigade was aware of this advance he sent for his third regiment. The Turks, finding the gullies closed, checked their advance and there was silence for an hour. Then a sudden fire broke out and the Turks now in obvious superiority were by 2 a.m. in many places as close as fifty yards to the thin Australian line. The squadrons on the left near Katib Ganet were hard pressed, but it was on Mount Meredith, a high dune in the centre that the full weight of the attack was felt. At 2.30 the Turks charged the mount with loud shouts. The moon which was in its first quarter had now set, but the masses of the enemy were clearly visible against the brightness of the sand, and offered good targets to magazine fire. They were beaten back with heavy loss, the fallen rolling down the steep sand slopes as they dropped. But the steady pressure of the enemy on the flanks made Mount Meredith untenable, and at 3 a.m. it was abandoned. The squadron to the right of it was now taken in flank and suffered considerably but was ordered to hold its ground until a new position on the next ridge was taken up by a supporting squadron. At 3.30 the Australians immediately south having been forced back upon their led horses succeeded in disengaging themselves, and falling back to the second position. The Turks followed up swiftly, a machine gun on Mount Meredith sweeping the Australian line. Dawn broke showing the Turks how slenderly the position was held and at the same time revealing to the Australians that their right was being outflanked by strong forces. The reserve position was therefore abandoned, and the brigade withdrew to the line of the Wellington ridge, troop covering troop, and by steady and accurate fire denying the enemy their aim of a rush with the bayonet which would have swamped the defence. The Turks now opened fire with their artillery upon the infantry posts of the Romani defences and the camps in rear.

At 4.30 a.m. (August 4th) Colonel Royston brought up his 2nd Light Horse Brigade from its camp at El Maler near Romani, where it had just turned in on return from the daily reconnaissance. General Chauvel relying on the steadiness of the 1st Brigade had kept the 2nd out of the fight till daybreak had given some clue to the general position. He now ordered Royston to put two regi-

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ments on Meredith's right on the Wellington ridge. This was welcome help enough, but heavy pressure from the enemy and his advance between Wellington ridge and Mount Royston (see map) continually forced back the right. Between 5 and 6 a.m. the 1st Brigade was slowly compelled to retire through the 6th and 7th Light Horse who still held the western edge of the ridge with some sections of the R. Welsh Fusiliers. At 6.15 Colonel Meredith was ordered to bring his brigade back behind the 7th Light Horse to a position north of El Maler Camp. Slowly the 6th and 7th Light Horse abandoned Wellington Ridge squadron by squadron, commencing their withdrawal about 7 a.m. The enemy did not advance to the crest till an hour later, when they were driven off by the fire of the Ayrshire and Leicestershire Batteries R.H.A. This for the moment stopped the Turkish advance and gave some respite. But the outflanking movement was continuing along the slopes of Mount Royston, turning the right of the 2nd L.H. Brigade. The Wellington Mounted Rifles attached to this brigade were now thrown in, and a squadron of the Gloucestershire Hussars from Pelusium also gave a hand. The situation seemed more than threatening, for the Turks were now within striking distance of the railway and camps.

But the battle is not always to the swift nor victory to the strong. The whole programme of the enemy had been upset by the stout resistance of the Australians; the Turks were tired, their water bottles empty. The battle was virtually won by the British. The eastern face of the position had also been attacked, but the pressure had not been enough to cause anxiety to the commander of the 52nd Division (Major-General Smith). Attempts were made to overwhelm works 4 and 5 with artillery fire and thus make a gap for the infantry. The fire was heavy and accurate and caused many casualties but the infantry attack never got closer than 150 yards to No. 4 when it broke down completely before the fire of the garrison and subsequent attempts were less resolute. At 7.25 General Lawrence had ordered the New Zealand Mounted Rifle Brigade at Hill 70 to move to Dueidar, picking up the 5th Light Horse there, and thence to attack the enemy's left who were attacking Mount Royston. The 3rd L.H. Brigade was ordered across from the Ballah railhead to Hill 70, sending one regiment to Dueidar.

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At 10 a.m. the Anzac Mounted Division (Chauvel) was holding a line from about 700 yards from No. 22 outpost—north of the Wellington ridge—to the sandhills north of Mount Royston. Chauvel had not received news of the advance of the 3rd L.H. Brigade and the Mounted Rifle Brigade (which were Section Mounted troops directly under General Lawrence's orders). A composite Yeomanry Regiment of the 5th Mounted Brigade had moved up via Dueidar and had come into action very opportunely 1500 yards due west of Mount Royston, enfilading a large body of Turks. The rest of the 5th Mounted Brigade was coming up to Pelusium station. Chauvel now asked the 156th Brigade to take the Australians' place while he watered his horses and prepared to attack the Turkish flank. The brigadier replied that his whole division was expecting to counter-attack and he could not comply. When Chaytor had received his orders to attack the Turks from Dueidar, the Australians were still holding Mount Royston, but when he approached the scene of the battle the Turks were on Mount Royston and were actually facing nearly north, so much had they worked round the British right. Colonel Royston himself galloped over to meet Chaytor who had found the Yeomanry in action against the Mount. Chaytor then decided to come in between the Yeomanry and the right of the Australians. Supported by the Somerset Battery R.H.A., the New Zealanders and the Yeomanry steadily advanced on to Mount Royston, though it was 5 p.m. before they even could approach the crest. But the Turk was done. For some time small parties had been slipping away, and at 6 the remainder hoisted a white flag, 600 men, two machine guns and a mountain battery surrendering to the Yeomanry and New Zealanders. Shortly before this surrender, the Turks had made a last attempt to advance across Wellington ridge, which however was defeated by artillery fire. At 5.5 General Smith had ordered the 156th Brigade to attack the ridge on the Anzac left, and in conformity with the attack on Mount Royston. In the meantime the Turkish commander who must have realized that his bolt was shot, ordered an attack against the Romani defences, no doubt to prevent a British counter-attack. It broke down leaving 500 dead in front of works 2 and 5. It was not till nearly 7 however that the counter-attack by the 156th Brigade became effective, and it was dark before

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the 8th Cameronians got to within 100 yards of the crest of the ridge where they were held up by infantry fire.

The Morning of August 5th.

The dropping of the curtain at nightfall on the 4th left no one in a satisfactory position. The troops in the Romani defences were in hand, but of the five mounted brigades only one had not yet been in action, though probably the New Zealand Mounted Brigade and the 5th could be easily got together as the enemy in their front had surrendered. The 1st and 2nd Light Horse had had a terrible day, and had borne the brunt of the attack with the greatest gallantry and determination. They would be ready in heart for more, but horse and rider needed rest. However tired or weary, fresh or jaded, it was desirable, nay imperative, that the Turk should be pursued and suffer severely for his temerity. General Lawrence issued orders for a general advance at 4 a.m. During the day the 42nd Division or rather its infantry brigades had arrived at Pelusium station from the Canal, and were available in support. The 1st and 2nd Light Horse Brigades despite their fatigue started the pursuit early in the morning assisted by the 156th Brigade, quickly capturing 1000 prisoners who had remained on the ridges during the night. Lawrence's orders were for the 52nd to advance on the line Katib Ganet—Mount Meredith, the Anzac Division on Hod El Enna on the right of the 52nd Division. The 3rd Light Horse Brigade (Cantill) was to move on to Bir El Nuss, and attack Hod El Enna from the south. The 42nd Division was to follow behind the Anzac Mounted troops. The 5th Mounted Brigade was to connect the 42nd with the 3rd Light Horse Brigade. The brigade of the 52nd and the Anzac Division between them accounted on and near Wellington ridge for close on 1700 prisoners including the 1000 already referred to, and during the advance parties of Turks were continually swept up. Away on the flank the 3rd Brigade had also effected the smart capture of over 400 Turks. Unfortunately it was late before the bulk of the 52nd got well under way, and the Turks escaped from anything like the mop up which General Lawrence had hoped for. The Anzac troops, and other mounted brigades which had all been put under Chauvel's orders, pushed on,

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and eventually charged mounted, with fixed bayonets against the Turkish rear line in front of Qatia. Bogged in a salt marsh the pursuit had to dismount and attempt a weary attack on foot. It very soon petered out, and the mounted troops spent the night as best they could on the desert facing the Turkish rear guards.

The infantry brigades of both divisions felt the heat considerably especially the 42nd, who were also late in getting under way, thus losing the cooler marching hours.

THE 6TH AND 7TH OF AUGUST.

The pursuing infantry on the night of the 5th were as follows :— 127th Brigade at Hod El Enna, 125th on its left, the 156th next, with its left on work 21, and the 157th Brigade on the ridge south-west of Abu Hamra. General Lawrence ordered the pursuit to be continued. The mounted troops less the 1st and 2nd Brigades which sorely needed rest, were to press vigorously at dawn, the 42nd was to move to the line Qatia—Bir El Mamluk, supporting the cavalry whenever required, while the 52nd less one brigade, was to advance from Abu Hamra, and occupy the line from the ruins of Qatia to Er Rabah.

During the night the Turks had fallen back, but the mounted troops found them as well posted in a fresh rearguard position covering Oghratina as they were the night before, and with a well-protected southern flank. The infantry moved as ordered suffering terribly, the leading brigade of the 42nd losing 800 men from the heat alone. The desert was covered with senseless and delirious men. During the morning Smith's column of some horse and the Camel Corps had reached Mageibra Wells. No further advance by the infantry was possible, and further pursuit was left to the mounted troops who on the 7th moved against the Turkish position at Oghratina, while the 3rd Brigade tried to turn their southern flank. The Turk however, always a skilled rearguard fighter, had fallen back on his old position at Bir El Abd which he had first reached three weeks before. The Camel Corps got round his flank on this day but was too weak to be successful.

THE END OF THE PURSUIT.

General Chauvel still hoped that some measure of success might be possible, and asked for all the mounted troops. These were placed

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at his disposal, the 1st and 2nd Australian Light Horse Brigades who had had 2½ days' rest, marched out from Romani through Qatia during the night (8th) to a point 2 miles north-east of Bir El Abd, to co-operate with the New Zealand Brigade at 6.30 (9th). The 3rd Brigade was to work round the enemy's left flank to Salmana, and cut off his retreat. The 5th Mounted Brigade was held in reserve. The attack was launched in good style from right to left, but the Turks had been reinforced by fresh troops and their left flank was never really found. The German artillery fire was very heavy, and the horse artillery was out-metalled. The Turks had already made one strong counter-attack. About 1 p.m. the enemy launched another determined attack and these were maintained all the afternoon, which clearly proved that the Turk had reached his supplies and that his troops had recovered from their fatigue. At 5.30 General Chauvel ordered a withdrawal, which was the last of the Battle of Romani.

Comments on the Battle.

The enemy withdrew by the 12th to El Arish and the oases were completely cleared. Their defeat had cost them 4,000 prisoners, a mountain battery, 9 machine guns, a large quantity of ammunition, horses and camels, and two field hospitals, while at Bir El Abd he had been compelled to destroy a large quantity of his stores. Close on 1300 dead were buried by the British, and Sir Archibald Murray estimated his total losses at 9000. Marshal Liman von Sanders says it was a third of the force, which would be some 6000. It was a very great disappointment to the troops and their commanders that considering the state of exhaustion to which the Turk had been reduced there was not a bigger mop up. This is a point on which there was considerable criticism, and among the points which have been criticised is General Lawrence's command station. He did not move up till the 6th, and there is no doubt that could he have been up the co-ordination would have been closer and the delay in the advance of the 52nd would have been less. Some of the messages had been delayed owing to interrupted wires and other causes. On the other hand General Lawrence was expecting an attack on his line between Romani and Dueidar, and had a specially laid counter-attack in waiting, which required careful launching.

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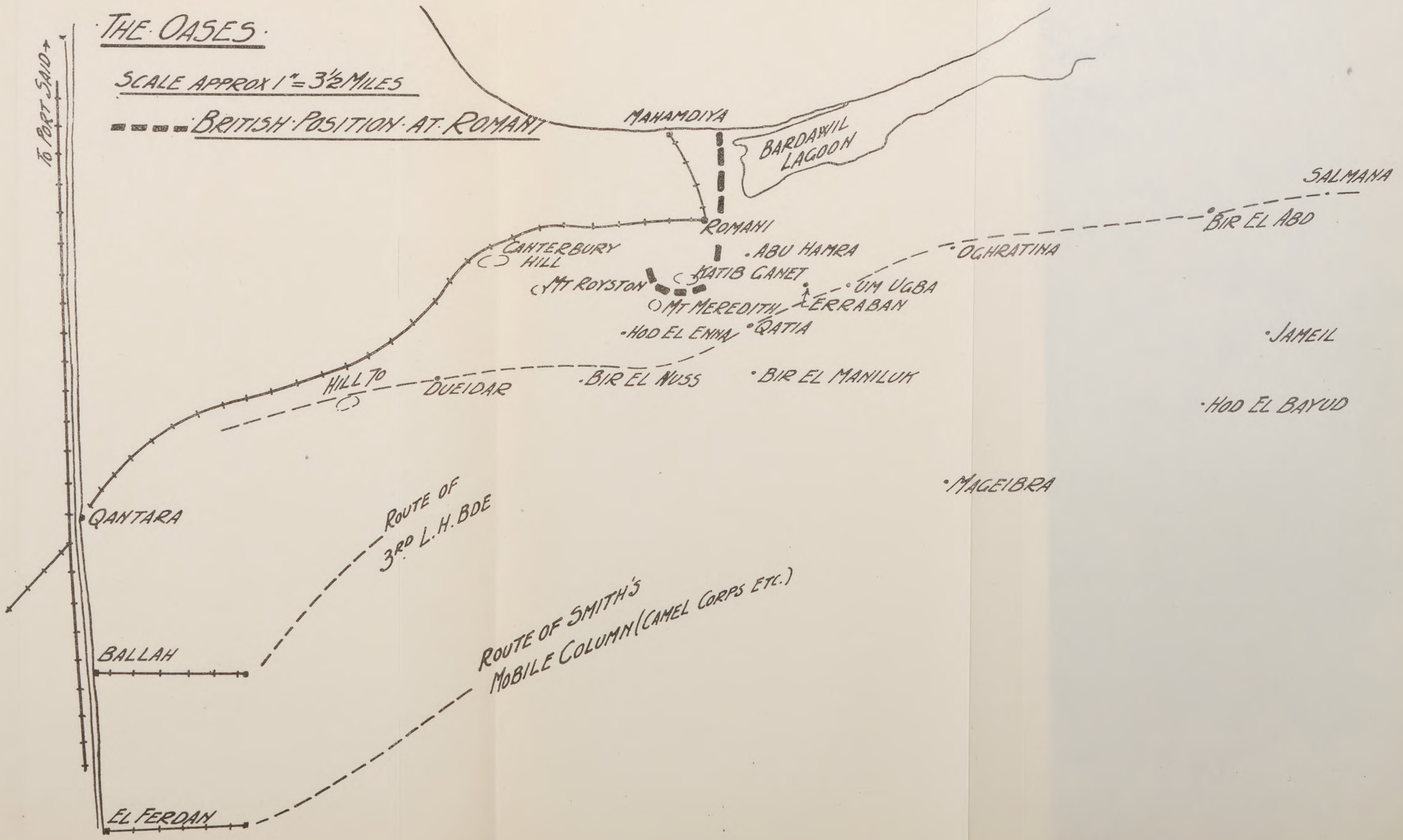
THE OASES.
SCALE APPROX 1" = 3½ MILES
BRITISH POSITION AT ROMANI
TO PORT SAID
MAHAMDIYA
BARDAWIL LAGOON
SALMANA
BIR EL ABD
ROMANI
CANTERBURY HILL
ABU HAMRA
OGHRATINA
KATIB CANET
MT ROYSTON
UM UGBA
MT MEREDITH
ERRABAN
HOD EL ENNA
QATIA
JAMEIL
HILL 70
OUEIDAR
BIR EL NUSS
BIR EL MANILUK
HOD EL BAYUD
MAGEIBRA
QANTARA
ROUTE OF 3RD L.H. BDE
ROUTE OF SMITH'S MOBILE COLUMN (CAMEL CORPS ETC.)
BALLAH
EL FERDAN

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Criticisms of this kind however must be of an academic nature, in which for future instruction we study counsels of perfection. What we have to realize is that the fight was fought in the great heat with a precarious water supply, and no man who is not cognizant of the actual state of the troops and animals in that heat and under those conditions has the least right to criticize except in the very humblest manner of the searcher after knowledge.

It will be observed that the Turk walked straight into the trap prepared for him in the parallel dunes south-west of Katib Ganet, which the Australians had occupied in so timely a manner, and where their staunch behaviour enabled the battle to eventuate on the lines planned.

Our actual casualties were largely among the Dominion troops, and totalled:—killed, 22 officers, 180 other ranks. Wounded, 81 officers, 801 other ranks. Missing, 1 officer, 45 other ranks.

The result was a decisive victory, without severe loss to ourselves, and was the last occasion that the Turks attempted offensive action against the Canal. For the future it was the British who were always to be the assailant, and who were now free to drive their wonderful rail and pipe line over the desert for a hundred miles and more, and so enable Lord Allenby to carry out his successful campaign and the conquest of Syria.

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THE AIR REQUIREMENTS OF THE ARMY.

A Lecture delivered at the Royal Artillery Institution, Thursday, 21st October, 1924.

By Major-General Sir W. E. Ironside, K.C.B., C.M.G., D.S.O.

Major-General C. F. Romer, C.B., C.M.G., in the Chair.

Chairman: Gentlemen, it rather appeals to my sense of humour that I have to introduce to you General Ironside, I not being a Gunner and he being a Gunner, Still, I do so.

General Ironside: I am going to talk to you this evening upon a controversial subject, but I want to say at once that this lecture is given in no sense as an ill-natured criticism of present arrangements as regards Air matters. But, from the experience I have had during the War, after the War, and now looking at things academically, I am convinced that, under the present régime, there is a chance of Army requirements as regards the Air being glossed over to a certain degree. That is to say, the people who are now responsible for all air matters are thinking of something which they consider much bigger—a purely air war. This country, however, still maintains an army evidently with a view to its operating in the field at some future period, and that army must be placed in the field complete with all the essentials of war. I will quote you an example. No one would think of taking away all motor cars from the Army, simply because there are fighting tanks and armoured cars, and yet all aeroplanes have been taken away from the Army because there are fighting aeroplanes. The Air Service is new and people who are dealing with new things are apt to make a mystery of them. In the past, we gunners have been some of the worst offenders in this respect. How often have we not said "Oh, well, you are not a gunner and you cannot be expected to understand." I teach at the Staff College that there

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is nothing that a good staff officer cannot understand as regards the direction of war. The Commander of the future will be a man who understands air action just as he understands the action of any other weapon of war. There is no black magic in the employment of aircraft. Things are new, but we shall settle down by degrees. There are few aeroplanes in peace-time and little money for development and the special requirements of the Army must naturally take their proper place in the programme. For us, there is a certain degree of danger in this state of affairs. It is therefore up to us to say what we require and to see that our views are given consideration. As regards the number of air units required for use with the Army, that is largely a matter of evolution. Just as in one campaign we require less or more cavalry, so we may require less or more air units. We cannot lay down now and for ever the exact units we require and their number per division or corps. There is one important reason why we should watch the situation with care and that is that there will be most certainly a great expansion of the Air Force as soon as the next war begins. As it was, the expansion in the last war was so great that we literally ran out of air personnel. The R.A.F. were scouring the Navy and Army for bold young men who possessed the necessary qualities for service in the air and we had to supply as many as we could. We knew that it was necessary to do so. The rate at which pilots and observers were required, owing to casualties and expansion, was so great that we ran out of them. As far as the Army is concerned, unless we ensure that the kind of machine that we require, with suitable pilots and observers, is maintained in peace and earmarked for use with the Army in war, we shall find that the expansion of the Air Force will swallow up our air resources altogether. We do not want to go to war with untrained boys directing our air reconnaissances and artillery bombardments. There is a danger that this will occur, even with the best of goodwill on the part of those at present responsible, unless the Army can control its own air requirements. An army going into the field with unsuitable air equipment will certainly suffer defeat.

In my lecture I am going to deal with this question as it affects the Empire. Roughly, Imperial policy has been this. We are concerned with the maintenance of Balance of Power in the world.

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We are people who have collected a great deal of property and we want to keep it safe. We therefore want peace. We want to develop our property. Other peoples can expand, so long as they do not take away our property in the process. It upsets us and our trade if the Balance of Power is disturbed. We are thus usually to be found supporting weaker states against the aggression of stronger states. That was what happened in 1914. France was weaker than Germany. We knew that, and the Entente between ourselves and France grew stronger and stronger as we realised that the Balance of Power was likely to be upset.

The wise employment of our naval strength has been the foundation of our whole policy in the past and it will be so again. In the War of 1914-1918, our greatest contribution to the allies was the effort of our Navy. Without the British Navy the allies could not have won the war. If you look back you will see that our war efforts as regards armies have always varied according to the strength of our allies. If they were weak we had to increase the size of our army contribution, in order to see that there was no collapse on land. Think for a minute of the Peninsular war. We had to go to the Peninsula because Napoleon was upsetting the Balance of Power. We had to build up a large army because Spain and Portugal were so weak that they would have collapsed without the help of our army. And so in the War of 1914-1918, we started with a small army contribution but had to increase it tenfold owing to the weakness of France and the collapse of Russia. Our policy in 1914-1918 was not a departure from our traditional policy. The Naval effort was our greatest contribution to the allied cause, though perhaps not the most costly.

Outside the main effort of the Army we find that we have usually made war in small packets all over the world. We have a great Empire and have to look after it. There are questions which do not affect Great Britain, but which affect the outlying stations—some hinterland perhaps, that has to be dealt with as a minor operation of the main war. That was one of our great difficulties during 1914-1918. Our allies were saying to us all the time, "Victory in the main theatre of war and all is well. Put all your resources here." But we had to continue the policy of the Empire, and could not afford to relax our efforts at the outstations, for fear

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of having a succession of expensive campaigns for the re-tranquilisation of the Empire after the crisis of the Great War had passed.

For the purposes of this lecture I have divided possible Imperial wars into three categories. The advent of a militant air force leads me to do this. First of all there is the war against an enemy who can bring air action to bear against Great Britain; secondly there is the war against an enemy who cannot bring air action to bear against Great Britain; and thirdly the small war. I make this division, not because I have forgotten the Dominions in any way, but simply because, at the moment, the main reserve of material and men lies in Great Britain. If an enemy Air Force can destroy this main reserve then the Navy cannot live, the Army cannot live, and the Air Force cannot live. If the steel and the wood and the materials out of which aeroplanes, guns, ships and ammunition are made, are destroyed, then we cannot make war any longer.

In the first two categories, I take it that war will commence with intensive air action. The enemy will try to bring air action against any vulnerable point within his radius of action. If he cannot reach the main reserves he will try to reach the lesser reserves or the communications connecting the main reserve with the lesser reserves. In a small war, on the other hand, enemy air action will be negligable

I take it as an axiom, and I teach it at the Staff College, that air action, like naval action, cannot finish a war. If you carry your mind back through history you will see that blockades and destructions never obtained a decision, though they permitted the Armies to do so.

It may well be, in some future campaign, that our allies are strong enough in their armies to obtain a decision when helped by our Navy and Air Force. In this case our contribution will be limited to a small contingent in the main theatre of war—just as France's was in Palestine in a minor theatre—and to the usual small packets throughout the Empire. It will certainly fall to our lot to deal with outlying enemy possessions.

You may not agree with me, but I maintain that war cannot be brought to a successful conclusion without the action of an army.

Let us take a first category war. In 1914 the Navy guaranteed

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the Army the safety of its ports of embarkation and disembarkation and maintenance in the field thereafter. That is to say, they said "Your ports are all right. You can get into your ships. You can land on the other side. We well keep off the enemy's navy and we will guarantee that the men and material you want in order to keep you in the field will be brought safely across. We will protect it." The Navy cannot do this now. The Air Force must first guarantee against enemy air action the safety of the bases of the fleet and the centres of supply of the fleet material. This, to my mind is the first duty of the Air Force in future wars. The Navy must be free to keep the sea. If we have no Navy to go out on the Imperial communications then the Empire will crumble to pieces. Our raw material will always be sea-borne and in war there can be no Imperial concentration of force unless we control the sea communications of the Empire. The Army will not be able to leave the shores of Great Britain until some sort of decision has been gained in the air.

Now, as regards the air action that may be expected. Air fighting over Great Britain and over our opponent's territory will be fierce and casualties amongst air pilots heavy. The rival air forces will destroy each other at a great rate and there will be much manœuvring for supremacy. In my opinion, it is more than probable that a species of air stabilisation will supervene after the first intensive action. Neither side will be able to expand their air resources at a rate to give them supremacy—for to be effective, bombing from the air must be both heavy and continuous. A further reason for stabilisation is this. With all the bombing that is taking place—it is like the Kilkenny cats—all resources will be reduced and amongst them air resources as well.

It is when this stabilisation has occurred that nations will put their armies in motion.

I teach at the Staff College as an axiom that when the Army has started, the centre of attraction and the centre of interest has shifted to the operations of the Army. It does not matter who directs operations so long as he understands war in all its branches and is served by an efficient staff. There cannot, in my opinion, be an Army Commander and an Air Force Commander, both receiving instructions from different Ministries, and acting indepen-

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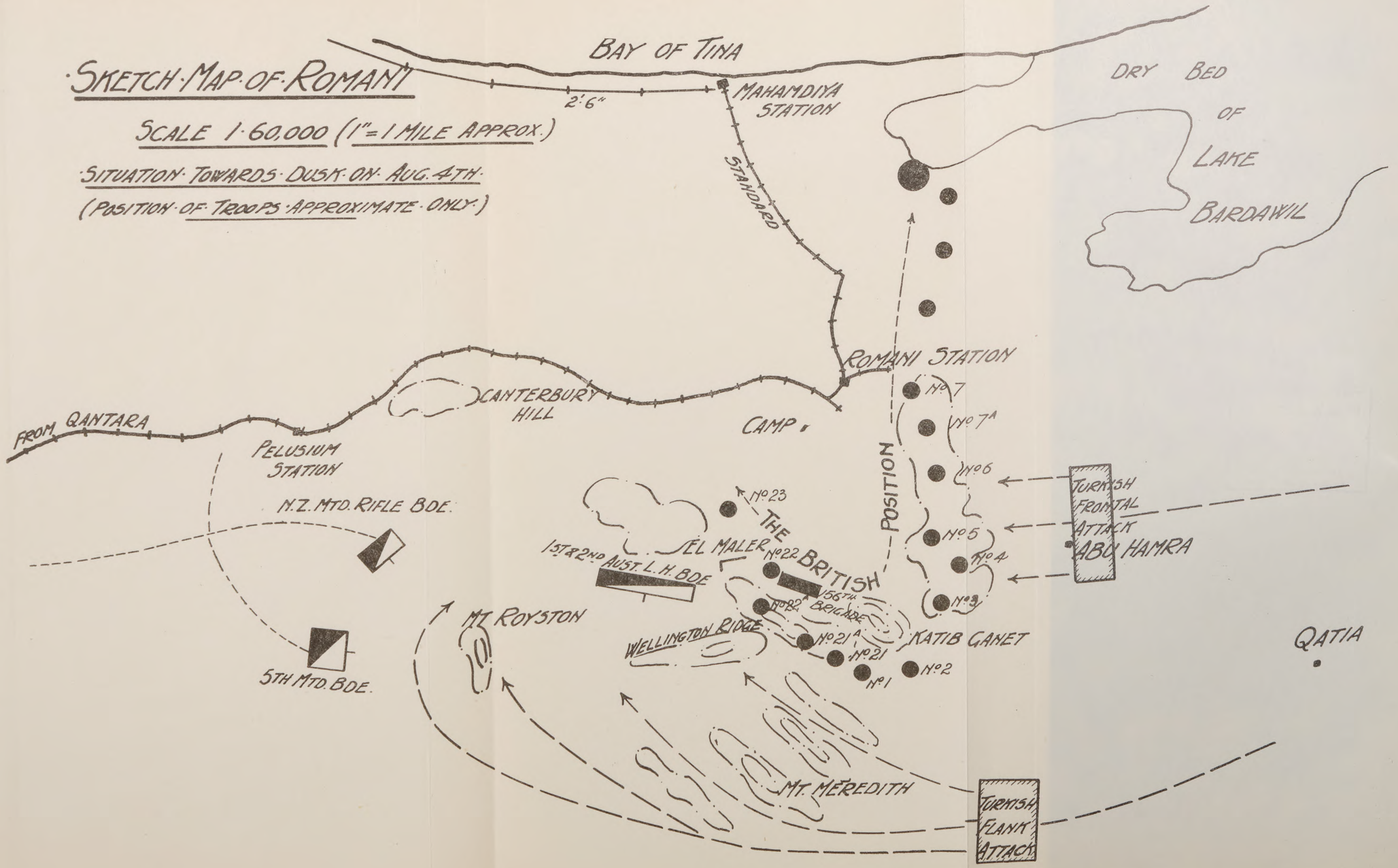

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dently of one another. It is asking too much of human nature, to expect co-operation under such conditions. I am more than suspicious of the term preponderant partner. In actual practice, the preponderant partner will be that service which is directed by the strongest personality—and that may not be the service intended for the preponderant rôle.

As regards the little packets of troops in outlying stations of the Empire, it is important to ensure that they undertake no operation without proper air support. Authorities are very apt to despatch a weak force to carry out a small operation. They reason that the enemy is only of second rate efficiency. It is thus that we get so many minor regrettable affairs. It is necessary, therefore, to ensure that sufficient air resources are left outside Great Britain, so that Imperial outposts can be properly equipped, even while the centre of the Empire is being attacked. An air strategical centre outside Great Britain must always be maintained.

To digress for one moment on a matter of nomenclature. I find it difficult to stop people using the objectionable term "ground troops" when speaking of the Army. The Army is divided up into definite arms of the service and into definite units. Air units operate with divisions, brigades, infantry, cavalry and artillery and not with "ground troops." If the term can be applied to any troops at all, it should designate that 98% of the Air Force which is required upon the ground to keep their machines in the air.

In a first category war, the rôle of the Air Force appears to be as follows :—

(i) The gaining of supremacy in the air over the main theatre of war with a view to :—
  (a) Guaranteeing the safety of the main reserve of men and material.
  (b) Guaranteeing the freedom of action of the Navy.
  (c) Preparing the way for action of the Army.

(ii) The maintenance of an Air Strategic Reserve for Imperial purposes outside the limits of Great Britain.

(iii) The supply of suitable Air units for air work in the Army and their maintenance in pilots and air personnel and material.

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Now I come to second category wars. I wish to explain some of the difficulties of applying air action and the danger of applying premature air action. Take for instance countries the capitals and important centres of which lie out of range of our possible air bases. The enemy moral cannot be attacked as the Air Force desire. The intensive air fighting cannot come so quickly as it will in a first category w . Air action must wait until the Army can bring the aerodror within striking distance of suitable targets. Again, the les highly developed a country, the less will be the moral effect of air action. Pure air action may be difficult to apply under any circumstances. If some suitable objective exists, there will be a tendency for the Air Force to strike prematurely, just as the Navy did at the Dardanelles. Such action tends to wake the enemy up and to force them to prepare. All surprise is lost and the Army finds the situation more difficult than it would have been had no premature action taken place. Real offensive action should not commence until all the forces necessary to ensure success have been made ready for the campaign.

Let us now consider the operations of an army in the field. There is the landing. At the present moment it is difficult to give any air support to an army effecting a landing in the face of the enemy. There are certain air carriers in the Navy, off which machines can fly, but they are an integral part of the Fleet and are liable to recall at a moment's notice. Moreover, as they have to steam directly up wind at high speed in order to take up machines, manœuvring off a coast line is a lengthy and dangerous proceeding. Seaplanes and flying boats may be of use to manœuvre close to the coast line or up rivers, but they cannot continue operating to even one day's march inland with the Army. An aerodrome ashore may take time to locate and prepare, and even then the transit of machines and stores to the aerodrome will take time, more especially if the machines come out in ships dismantled. What we require for such operations are special transports in which the machines can come out as complete and ready to fly as possible. They should be able to fly from the deck to the aerodrome. The machines should be of such a nature that they can use cramped and difficult aerodromes if necessary. Just as we have to organise special landing parties, so special landing aeroplanes must be organised to work

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with the landing forces. It is essential that the Army should not be deprived of its eyes at the critical moment.

Then comes the advance to the battlefield. In the early stages, before close contact with the enemy has been achieved, the Commander of an Army will depend largely upon his air units for the necessary information upon which to base his battle plan. I teach at the Staff College that orders to reconnoitring air units must be issued exactly as they would be to other reconnoitring units. They must be told exactly what information is required and in what direction they are to go to find it. Information is collected in many ways and is finally collated by the intelligence branch of the staff upon a map. The commander may look at this map every half hour and upon it he will see the results obtained by air observers, spies, strategical cavalry patrols and staff reconnaissances. The map is a kind of mosaic built up as reports come in. I have shown you that there will be a dearth of observers due to expansion and casualties, and just as a commander would send a staff officer to verify a situation by reconnaissance on a horse or in a motor car, so will a staff officer be sent to verify a situation from an aeroplane. I can imagine a situation in which a General wishes a special watch kept in a certain direction—either to watch for an enemy counter-attack or to ascertain the moment at which to let loose an attack to coincide with some movement to a flank—and he would certainly send up a staff officer to reconnoitre for such a purpose. A good staff officer is an expert at reconnaissance and he should be thoroughly trained to aeroplane work. No General can base his plans upon the unverified reports of inexpert observers. It has been argued that an observer in an aeroplane is really the protector of the pilot, in that he works the machine gun against enemy attacking machines and that the pilot is the real observer. To my mind, the important person in the reconnaissance machine must be the observer, be he staff officer or not. If protection is necessary, then the machine must be a three-seater. A suitable machine of good performance will soon be evolved when once the necessity for a three-seater has been realised. There is another reason for a three-seater. We all learnt the value of liaison in the late war. The feeling of isolation and neglect expressed in the words "Oh, the General never comes down to see us" soon leads to reduced moral.

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An aeroplane for liaison, when roads are blocked with transport, will often be a necessity for a General.

Then take the battle itself. When contact with the enemy has been gained, the importance of clear instructions to reconnoitring air units becomes more and more marked. Little is to be gained from observation of actual fighting. The picture is too variegated and too swiftly moving to be capable of record upon the map at headquarters. Air reconnaissance should be directed against the rear of the enemy fighting troops. An expert observer should be able to build up a picture of the proportion of troops being maintained in the fighting area from the working of the rear services. The close reconnaissance of the fighting must be left to the tactical reconnaissance of mounted and dismounted troops.

Offensive air action at this period should be directed only against suitable targets—enemy troop concentrations, depots, columns of transport and reserves—with a view to upsetting the machinery of his battle. It should not be directed against troops in fighting formations. Bombing will have little effect against fighting formations and low-flying aeroplanes will suffer heavy casualties for little result. The efforts of low-flying aeroplanes, like those of mounted troops, should be retained for action against demoralised troops or those unready for action.

All the operations of the aircraft operating with the Army must be directed by the staff upon a definite plan, worked out towards one end—the getting forward of the infantry to close range with the enemy. Air fighting, reconnaissance, day and night bombing, all must be directed for this definite purpose.

Now I come to the question of artillery and aircraft. There are two questions which have been much discussed. Observation and command. I would recall to your memory the period when indirect fire first came out. Many senior officers stoutly maintained that the place for the commander of a battery was with his battery and not at the observing station, unless the observing station was so near that the battery could be commanded by word of mouth. The most junior subaltern was sent to observe and the battery commander translated his observations into ranges—it was like employing two men to lay a gun. This phase soon died away

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and the battery was commanded from the observing station by telephone or signal. At present, the artillery proposes to depend upon observers found by the Air Force. It is deliberately giving up one of its eyes to another service. A very large proportion of artillery officers should be trained to shoot batteries from the air and should be available to take on shoots at any moment in a battle, should the occasion arise and observation from the ground fail. The more mobile the warfare, the more fleeting will become the opportunities. Only an expert artillery officer should be allowed to initiate emergency calls resulting in the expenditure of a great deal of ammunition and the shooting should be controlled by an artillery officer. We are too prone to imagine the next war as commencing with the same number of guns with which we finished the last and to dismiss artillery command from the air as fantastic—machines cutting off each others' aerials and so on. With a number of highly trained artillery officers available at the aerodromes and patrolling areas, there should be no difficulty in directing fire from the air. The necessity will soon improve the nature of the machine and the required communications.

There is no question of the C.R.A. taking the air and commanding from there. He must be with his unit commander. But, here again, I can imagine occasions upon which it will be necessary to detail a senior artillery officer to watch for counter-attack and with the right to switch off large numbers of guns should the occasion so arise.

In my opinion, the question of artillery observation will not be satisfactory until we have a large proportion of artillery officers trained to take the air, to be accustomed to move about freely in the air and observe and command from the air if necessary.

Now I will turn to small wars. I will refer to artillery matters first. There can be no possible objection to artillery officers commanding their batteries from the air if necessary. There will be few batteries in the field and very little, if any, enemy air action. A proportion of artillery officers can live at the aerodromes just as well as they can with their batteries. Targets are more fleeting than ever. Call to mind for instance in frontier warfare the enemy stealing away to avoid an assault or rushing after a withdrawal.

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Only an expert, actually directing fire from the air, may be able to bring about the necessary casualties—so salutary a lesson to the enemy.

Offensive air action will often be difficult to carry out in a small war. There is no objective perhaps—the enemy collects and fades away and his villages are not good air targets. If the final objective is pacification, the bombing of villages may not be politic. In poor districts supplies may be required for your own army and cannot therefore be destroyed. It is difficult to distinguish men from women and children at any times in these wars, but it is most difficult from the air. All these matters must be clearly laid down by the staff according to the policy of the commander.

Nothing is so important as the preparation of good aerodromes for the aircraft. If the aerodromes are bad, the casualties in aircraft increase out of all proportion. No amount of work should be spared to make these aerodromes efficient. Machines are more valuable in distant theatres of war than nearer home and must be preserved.

Aeroplanes and seaplanes should be available for liaison work according to the nature of the country, and they should be of suitable construction. The machine in this case is merely a vehicle used for an important purpose and nothing else. To ride for hours in an open aeroplane at a great height in winter is not conducive to good work at the end of the journey. We must have proper liaison air units for the use of commanders, staff and lines of communication. These units must have comfortable machines, capable of landing on cramped aerodromes and having the necessary radius of action at a moderate speed, say 200 miles at 90 miles an hour. On the Dwina in North Russia it was possible to fly 150 miles up the river, inspect points on the L of C and return the same day in a sea-plane. The direction of the L of C could not have been carried out without these machines, but their comfort could have been much increased by proper construction. Flying from Baghdad to Kazvin was an exhausting performance in an open machine. Starting at a temperature of 100° or more, with heavy flying clothes on, then up to 11,000 feet across snow and a final landing at 6000 feet with one's heart bumping at a change of altitude. The Army

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must have comfortable liaison aeroplanes, just as one has a comfortable liaison car.

For many reasons in these small wars, the aeroplane must be a vehicle and nothing else. The Governor of Somaliland flew up to interview the defeated enemy after the little Somali Campaign carried out by the R.A.F. The Germans directed columns in the bush by balloon wireless as far back as 1904. We should now direct them from aeroplanes.

Last of all I come to supply work. Supply work from the air is not yet with us on a large scale, though there have been numerous examples of carriage of supplies in the air. When I was over in Berlin the other day I saw the plans of a Zeppelin carriage, the bottom of which dropped out, depositing the load onto the ground at will. A lever was pressed and the cargo fell out. The construction of airships purely for supply work would be out of the question, but if airships were already in existence they might be employed in this way in a small war. It is merely a matter of calculation as to how much saving they could make upon the L of C.

What we want in the Army is practical originality as regards air questions. Officers do not get enough experience of it. They are prone to regard it as something outside their sphere. There is no mystery in the employment of aircraft. Most of the machines that are to be employed in intimate connection with the Army are merely vehicles—reconnaissance, artillery and liaison machines. These should be formed in an Army Wing under the control of the Army. We can then evolve our own essential requirements with the technical help of the Air Force, who would supply the machines, the pilots and the ground mechanics necessary for the maintenance of our units. We should then not run the risk of being supplied with unsuitable observers or unsuitable machines, a risk which we run at present to a high degree. (Applause.)

THE CHAIRMAN: I should like any officer who wants to make any remarks on this lecture to do so now. I do not know whether General Milne, first of all, would favour us with a few remarks.

GENERAL MILNE: Gentlemen, I am rather sorry I have not had the opportunity of seeing the précis of this lecture before coming

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down, because you naturally do not want any remarks from me in continuation of what the lecturer has already said. I should like to say—I wish I had not to say it, but I have got to say it—that I entirely agree with the lecturer, and the reason I say I wish I could not say it is that it would add more to the discussion, I think, if I disagreed. I hope someone is present here who will be able to give us the opposite point of view, because the opposite point of view is the one, I think I am almost right in saying, that is apparently held at the present moment in the British Empire, viz., that you can divorce the Air Force from the Army; you can divorce the eyes from the body; it is scarcely a medical theory.

There is one point I would like to mention, and I am very glad to see the way the lecturer rubbed it in, and that is that as you will read in papers or in pamphlets or in anything else about a war in the air, a war in the air is going to end somehow with the bombing of London. I think the bombing of London at Wembley started with the bombing of the War Office; that is the first thing that took place. I think that is very bad teaching indeed. The end of a war to my reading of it and in my experience and in the experience, I think, of anyone who has studied war is that it always ends on dry land and always ends with the infantry soldier. Everything else is subsidiary to the infantry soldier. He ends the campaign. It is up to us gunners as a subsidiary arm to do our best for them, and here we are at the present moment deprived practically of our very best method of observation. I do not think I need go on rubbing it in. It rather seems to me, and I am certain you will all agree with me, that it is like the parson who lectures people for not going to church; he always lectures those who are in church. I think we as gunners entirely agree with what the lecturer has said. But I think under present circumstances (and I refer this to the chairman) we want further assistance. We hear of army co-operation. I hate the word "co-operation." I am afraid my views are not altogther orthodox. But I will go further and say I believe firmly that so far as the Air and the Army are brought together in war the only way you can efficiently run a war is one War Lord to run the whole show and say exactly what is to be done; not a committee, but one man to say what is to be done. I know the difficulty. The difficulty is which service is

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that man to belong to. But unless you get something of that kind you will never get complete success. You want to organise everything. One brain must direct; that is the reason why Napoleon was such a success; he directed everything from politics to the Navy and Army, and I am positively certain that if there had been an Air Force he would have directed that too. I am certain he would not have allowed separate air forces to exist as long as he was running the army.

I must say that even though we have got army co-operation squadrons, I think we are badly neglecting the whole question of directing artillery fire from the land. I do not know that we are doing anything; I honestly do not think we are doing very much more than Colonel Kirwan and I did in 1914, if we are doing as much. We are not going into the theory of it and I do not think we can go into it and study it thoroughly until, as the lecturer said, the officers who direct the fire of the artillery in war are going to absolutely direct the fire in peace, because unless you can be in the air you are giving away the very best form of observation you have. You will be firing, especially in the next war, at about 25,000 yards; you could not possibly direct that fire except from the air, and you must have your very best man—the Major of the battery—up doing it.

The lecturer also referred to one other point. He referred to what is called air sense. You hear a lot of talk about air sense and the difficulties about going up in the air. Well, you know, anyone can do it; there is nothing in it at all. It does not want great powers of observation, but the observer must know gunnery and what to do when things are going wrong. That is why I am positively certain that we will never get proper artillery work in the field unless from the very start we train our officers—we play with it just now, we do not train them—to go up in the air just as they would use any other form of observation.

Of course, I quite realise, and I was going to ask the lecturer how he proposed to deal with this, that there must be, I suppose, two forms of Air Force. I suppose you must have an Air Ministry and an Air Force to take on the initial stages of a war. But I suppose it has been considered—perhaps the chairman can tell us something about it—that separate squadrons will be allotted and will come entirely under the Army even under the present régime.

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I do not know what is going to be done, but if the squadrons are coming under the Army in the next war then it is advisable that we should train with them and actually train them in peace.

I shall not say very much more; several others probably will want to speak; but I think I may say in your name how grateful we are to the lecturer, who has a distinguished career not only in the Artillery, but in the Staff, and who can speak with great knowledge of these things, for coming down to give us his views, because it gives you all a great deal of food for thought for the future. It is a subject I am always rubbing in. We do not think nearly far enough ahead. It is our duty to deal with the thing perfectly locally for the moment, but you have to think ahead and think of what future war is going to be. All these questions must be thought out and considered, and if you do not start considering when you are fairly young you will get rather bored with them when you get old. I would take this opportunity of thanking General Ironside very much indeed for his lecture, for the points he has brought out which are most useful and practical to us all and for the forceful way in which he has delivered them.[1] (Applause.)

THE CHAIRMAN: Will any gentleman who differs wholly or partially from the lecturer be pleased to address us—if he is bold enough?

GROUP CAPTAIN MAC NEECE: The most interesting lecture which General Ironside has delivered has touched not only on Air co-operation and various additions which he would suggest, but also by—I will not say innuendo, because that is a most unpleasant word and I do not mean it—by some word more polite than innuendo it has raised the question of the necessity of a separate Air Force. The Air Ministry will doubtless be able to render in far more reasoned and convincing form the many ways in which, I do not doubt, that they would disagree with General Ironside's most interesting lecture, but I do think, in view of the chairman's invitation, it is a good thing perhaps to say a few words on the spur

[1] NOTE.—Since making these remarks I have heard the Air Force point of view and I am bound to allow there is a lot to be said on the other side. The whole subject deserves much thought.

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of the moment from the Air point of view, more especially as the Air Ministry reply will not in the nature of things reach a very large proportion of the people who have had the good fortune of hearing General Ironside's lecture.

I wish that we could agree with the future outlook of war which General Ironside has suggested. Because the principles of war are unchanged and unchanging, therefore I think that there is a tendency to think that wars will be waged in more or less the same old way, but actually we do not think so at the Air Ministry, and I think, as was pointed out, public opinion agrees with us. You have only to look round to take the opinion of the ordinary intelligent man with an eye to the developments of science, to take the example of the Cabinet Minister responsible for the safety of the country, whether he is Labour or Conservative, and to find the provision which the Government in power grudgingly and of necessity has had to make for the Air Force to expand at a time when both the senior services are most regrettably forced to contract, to gather that in the background of their mind there does lurk a fear that the next war may quite possibly be over before a ship moves into action or a soldier leaves this coast. After all, it is not a question of what we want; it is a question of what we can have, and the election reminds us that it is a very poor fate that awaits anybody who goes out into the country and says that he wants unlimited armaments. We have to concentrate on what is the urgent matter. I think that if public opinion was asked what was the urgent matter they would say it is not invasion from the sea or anything approaching it; our Navy can guarantee that a thousand times; and it is not invasion from the land, for our Army could cut up those few thousand soldiers of the enemy who had eluded the vigilance of the Navy; but it is this attack from the air. After all, London is the nerve centre and capital of England, and even more than that, of the Empire, and it is incomparably the most suitable and inviting air target that anybody can imagine. It has 5,000,000 inhabitants who cannot go for refuge; it has got an enormous area, and please remember, that a bomb dropped in Whitechapel may have just as much effect on the prosecution of the war and on the moral of the country as a bomb dropped in Whitehall. It has got a river which

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will guide the enemy by night, and we in the air have got to admit that we cannot guarantee altogether preventing the enemy from getting to London—our retaliation is to bomb their vital centres too—and finally, London is so close to the coast that we get very little warning. I think that it must be admitted that since only the air can meet the air, the biggest problem (I may be wrong and I am sure that most of you will not agree with me) that we have to face is this attack on London and on England generally which may put continental wars entirely in the background, and I think that is the reason why for the moment the Air Force lays itself open to the accusation of concentrating on what is our main objective, and if we do, it is not from any lack of sympathy with what are the Army requirements, and one cannot but agree that many of General Ironside's statements are most interesting and instructive and most idealistic; but we have to concentrate on what we can get. I think that is all I have to say. (Applause.)

GENERAL GILLMAN: I have really very little to add to what the lecturer and General Milne have said, but I do feel that the bone of contention between us and the Air Force is in this question of whether an aeroplane is a vehicle or a weapon. I think it must be both, though my friends in the Air Ministry disagree with me. I think, just as much as a motor car is a vehicle and if you put a gun into it it is a weapon, so an aeroplane can be and should be used for both if necessity arises. We gunners must be responsible for putting our shell in the right spot, and any methods or any vehicles, whether they are in the air or on the land, which we can employ to help us to put our fire right should be at our disposal. It is wrong to my mind for us to be at the mercy of what I can only say must at any rate sometimes be an untrained young flying officer, who knows very little about our requirements. At the beginning of a war I have no doubt that the officers will be available, but with this fearful battle, which both the lecturer and the last speaker have envisaged, in the air, unless the air is going to win the war straight away by itself, I foresee a bombardment somewhere for the accuracy of which we gunners must be responsible, and it is only right that we should have our men up there to help in the observation of that fire.

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I think there is one point about it when we send up senior officers, which we will have to look to, and that is that you are not likely to be able to grasp the situation of a big front if you are a senior officer or a staff officer up in the air, and I think going up as gunners you should try and concentrate on the observation of fire on a limited objective if you want to be accurate.

I do not think I want to say anything else, except to agree most heartily with what General Ironside has said. I think there is a very pressing need for air observation in the artillery, and if the gunner is allowed to go up and sit in an aeroplane it is a question whether he will be able to wireless back his messages and defend himself at the same time, or whether we may be driven to ask for some kind of aeroplane that will take somebody to protect him as well. That is a question which must be left to the future, but I do hope in the near future we shall get courses with more officers up in the air, getting more practice, so as to give us a guide as to suitable types of aeroplanes for us to go up in. (Applause.)

THE CHAIRMAN: Does any other gentleman wish to speak?

CAPT. E. ASTLEY RUSHTON, C.M.G., R.N.: I should like to claim your indulgence to make a digression—and in evening dress, if you will forgive me, but as a matter of fact it is Trafalgar Day. I do not mean to imply that sailors always go about in evening dress on Trafalgar Day. But I do want to take the opportunity which presents itself, which may be the last one I shall have—I do not know—of saying how very much the Naval Staff College appreciate the kindness of the authorities in allowing us to attend this institution and hearing such lectures as we have heard to-night.

GENERAL IRONSIDE: Gentlemen, I have little to say but to thank you for the applause.

I think you will all agree with the Air officer, who is very kind to us—he has been to lecture to us at the Staff College and he is well known at the Staff College—that this war in the air is the thing that is going to happen first, and that your attention will probably be directed towards that, but if you are going to use your Army it is essential that they should not be deprived of these

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resources without which you cannot fight, and I am quite sure that I am right when I say that this expansion will absorb everyone who knows anything about the air in the first part and we want to avoid that. That is all; we must not, simply because an aeroplane goes in the air and is something new, be deprived of our proper vehicle and stopped from fighting a war as we think it ought to be fought. That is the answer that I should like to make to him. I know that that fighting is coming in the air; I am quite certain of it, and in the case where they can get at us in England that fight is going to be intense over London; that is agreed. But I ask you, what is the position if we fight Russia? I put it to you as my second category war which is far more in the near future than any other.

Gentlemen, I thank you very much indeed. (Applause.)

GENERAL MILNE: Gentlemen it only remains for me now to say in your name how very grateful we are to the speakers of the other services who have given their views, and also to thank General Romer, Director of Staff Duties, for having given his valuable time in coming here to be present at the lecture to-day. (Applause.)

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THE EVOLUTION OF ARTILLERY IN THE GREAT WAR.

By Bt. Lt.-Col. A. F. Brooke, d.s.o., *p.s.c.*, Royal Artillery.

III. THE EVOLUTION OF ARTILLERY EQUIPMENT.

IN the two preceding articles we laid a foundation for our study of the evolution of artillery, in the shape of a brief summary of the situation existing in 1914, and subsequently erected a scaffolding to our future study by examining the possible lines of artillery evolution. We should now be in a position to turn to the actual period of the war, and to examine the artillery evolution from its various points of view. Our task will be simplified if we commence by treating the equipment and organisation separately, thus freeing ourselves of technical details when we turn to the evolution of artillery tactics. Such a sub-division of the subject is necessarily entirely artificial since the evolution of equipment, organisation and tactics are all interdependent, it will consequently be necessary occasionally to merge the three subjects into one, in order to maintain a true perspective of the subject as a whole. As we had foreshadowed in previous articles the first few days of active operations were sufficient to open our eyes to the fact that we had underestimated the effect of fire power in modern war. The demand for increased artillery power became apparent. The outcry for more guns and more ammunition became increasingly imperative. The Germans had gained a material surprise from the outset through the employment of their heavy artillery in the field, especially as regards their 15$^{c}/_{m}$ how., England and France were consequently forced to turn their attention to the production of similar equipment. The effect of small arm fire, both from rifles and automatic weapons, was proving such as to deny the necessary power of mobility to infantry inadequately supported by artillery, thus necessitating an increased proportion of artillery in the attack. We therefore see that from the very outset of the war the process of artillery evolution commenced.

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We shall in the first place, consider the effect of this evolution on artillery equipment, and, for the purpose of simplicity, we can best sub-divide this subject under three headings :—

1. Guns.
2. Ammunition.
3. Accessories.

1. Guns.

(a) Field Artillery.

When we consider the vast scale of the evolutionary changes which artillery underwent during the Great War, it is surprising that our field artillery equipment was so little affected, a factor which stands greatly to the credit of our 18 pr. and 4·5″ how. As we have seen in a table published with the first article, we had selected, in the 18 pr. an equipment slightly heavier than the French or the Germans. This extra weight was justified by our experiences of the war. Our field gun was certainly not perfect, but its defects were only of secondary importance, and may be briefly classified as under :—

(i) Inefficient recuperator.
(ii) Insufficient traverse.
(iii) Insufficient range.

The recuperator question was taken in hand early on in the war, and by the end of 1918 all springs had been replaced by air recuperators. This defect had, however, been responsible for a considerable loss of artillery power during critical days, and especially during the prolonged operations on the Somme in 1916.

The lack of traverse on the carriage began to be fully realized with the advent of the tank. By 1918 experiments were proceeding with the present split trail carriages. The desirability of increasing the range was soon realised, and the results of evolution in this direction are exemplified by the one battery of 18 prs. Mk. IV on Mk. III carriages which was sent to France in 1918 with a maximum range of 9200 yds, an increase of close on 50% on the original range. In France and Germany the same evolution was taking place, no radical changes in either the 77$^{m/m}$ or the 75$^{m/m}$, but a steady tendency towards increased ranges. The field howitzers were less affected

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than the field guns, but, by the end of the war, had more than justified the necessity for this nature of equipment. The French were never able to correct their initial error of judgment under the stress of production of the heavier natures of ordnance, and remained hampered to the end through the lack of a suitable light field howitzer.

(b) Medium and Heavy Artillery.

We have seen that in 1914 the heavy artillery and siege equipment of the Expeditionary force consisted of 60 prs. and somewhat obsolete 6″ hows., a very small nucleus, necessitating the birth of many new equipments in the process of evolution. The original 60 pr. suffered from a defect in the shape of a type of cradle presenting difficulties in the process of manufacture, and as a result production was seriously delayed. It is to be hoped that this lesson may not be forgotten, and that in all future equipments the possibilities of rapid mass production will be kept in view. By 1918, at the time of the Armistice, four new 60 prs. were ready for issue, the new equipment being designed on the same general lines as the new 18 pr. and gave a 50% increase in range. The old 6″ how. was soon replaced by a new model which proved itself thoroughly efficient, though somewhat lacking in range. A 9·2″ how., the original "Mother," had been approved in July, 1914, and was sent to France by November, 1914, orders were placed for manufacture, and by December, 1916, 233 of these hows. had been delivered. Owing to the continual demand for increased ranges, a new model was made and issued in 1917. The demand for long range guns was met by employing 6″ guns which could be spared from our Coast Defences, owing to our favourable situation on the sea. These guns were mounted on field carriages, and provided the original 6″ Mk. VII equipment, which suffered from distinct lack of mobility owing to its excessive weight, i.e. 26 tons. This fault was remedied by the introduction of the 6″ Mk. XIX weighing only 16 tons 10 cwt. whilst retaining the same original range. In order to meet the initial requirements in heavy howitzers, a proportion of the 6″ guns were cut down and enlarged to 8″ bore firing a 200lb. shell. This new howitzer suffered from the same defect as the 6″ gun and was too heavy. A new 8″ howitzer was consequently designed of the

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same type as the 6″ how., and giving a further increase in range. We therefore see that in the evolution of our medium and heavy artillery we were forced to follow the line of least resistance owing to the stress of war, and consequently the types evolved were seriously affected by resources available.

By the end of the war our original 60 prs. and 6″ how. had been replaced by the following equipments:—

60 pr. gun.	6″ how.
6″ gun.	8″ how.
	9·2″ how.

(c) Super Artillery.

The battle between fortifications and armaments had already in 1914 resulted in the appearance of super-howitzers. The German strategic plan was dependent on the rapid reduction of fortifications such as those of the Fort of Namur. The famous Austrian 17″ howitzers had been designed specially for the reduction of concrete defences. Although these weapons had been primarily intended for siege operations, it was at once evident that trench warfare offered suitable opportunities for their employment. Certain trials had already been carried out in England with a 15″ how., the original "Granny." Mr. Winston Churchill, in the capacity of First Lord of the Admiralty, was quick to realise the value of this new weapon, and by November, 1914, had ordered twelve of these pieces destined to be manned by R.M.A. personnel. These weapons did good work, but it was soon realised that they suffered from lack of range. The 15″ how. was soon followed by the 12″ how., 32 of these howitzers being ordered shortly after the commencement of hostilities, 24 on railway mountings and 8 on road mountings. Insufficient range was also the failing in the original models, this defect being remedied in the later types which had a maximum range of 14,500 yds. The process of evolution was still manifest at the time of the Armistice, in the shape of an 18″ how. which was under construction and destined to be used on the same carriage as the 14″ gun.

The call for super-guns followed closely on the heels of the demand for super-howitzers. By the end of 1915 delivery of this

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type of ordnance had started. 9·2″ Coast guns were mounted on railway mountings and sent to France, followed by 12″ guns in 1916, and 14″ guns in 1918. It should be noted that evolution in this direction had only been rendered possible by the assistance of modern railways. It is, therefore, interesting to examine the types of railway mountings produced. These may be classified under three distinct types :—

(i) The semi-mobile mounting, only destined to convey the gun to the selected site, where it was lowered on to a concrete bed, and the railway bogeys removed.

(ii) Mobile mountings fired from the actual track, with the weight of the equipment resting on the rails during firing, and requiring curved sidings in order to obtain the required traverse.

(iii) Mobile mountings lowered on to the sleepers before firing, and provided with a varying degree of traverse on the carriage.

The first of the above methods was extensively employed by the Germans, the last two were used by ourselves, the third type being the latest stage of evolution, but only suitable for the lighter types such as 9·2″ guns and 12″ hows. Our brief summary of the evolution of super-artillery would remain incomplete without a reference to the astounding increases in ranges which characterised this nature of guns. The shelling of Dunkirk by the Germans in 1915 at a range of 20 miles caused considerable surprise, and yet within three years the Germans were shelling Paris at a range of 75 miles. A tendency exists to consider this gun in the nature of a freak, or merely one of the many types of "Hun-frightfulness." The fact must, however be recognised that in reality we are faced with one of the very distinct steps in the evolution of artillery. Extreme ranges are rendered possible by certain definite factors which were admirably explained in a lecture delivered by Major Maitland-Addison, and published in this Journal in 1918. It is, therefore, not necessary to elaborate these factors in further detail. It is, however, interesting to note that this equipment was constructed from worn-out 15″ guns bored out and lined with 8″ tubes; no drastic changes were required to produce these extreme ranges.

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The Germans had seven such guns in use during 1918 and more under construction, whilst the British, French and Italians had all started on the construction of similar equipment by the time of the Armistice. The fact must consequently be recognised that the "extreme range" gun has definitely taken its place amongst the possible armament of the future, and as a result the southern coast of England has now been placed within extreme artillery range of the continent. Appendix D (D1. and D2.) gives a graphical conception of the increase in ranges of various guns and howitzers during the war. The original diagram was published in General Herr's book, but has been amended to include our own equipments.

(d) Trench Mortars.

We must now descend from the rarefied atmosphere traversed by the projectiles of super-guns to the mud of trenches inhabited by trench mortars. In the trench mortar we are confronted with a "throw-back" in the process of evolution. Although mortars had previously occupied an important position in siege operations, their use with the Army in the field had not been contemplated prior to the Great War. Improvised models appeared early in 1914, and will always be remembered by the impartial way in which they inflicted casualties amongst our own and the opposing troops. The Royal Engineers with their usual resourcefulness produced trench mortars out of gas pipes, and proudly handed the new weapons to the Royal Artillery as the privileged arm to handle this new type of ordnance! Various weapons were constructed during 1915, before evolution finally settled on three distinct types:—

(i) Light trench mortars manned by infantry.

(ii) Medium trench mortars manned by artillery.

(iii) Heavy trench mortars manned by artillery.

By 1918 the last of the above types had been definitely abandoned and only two types retained.

The more mobile nature of operations of 1918 produced a fresh impetus to the evolution of the medium mortars which up to that time possessed no form of transport. Various types of mobile mountings were experimented with, both "pack" and "wheeled," according to the existing theatre of war, research in this direction

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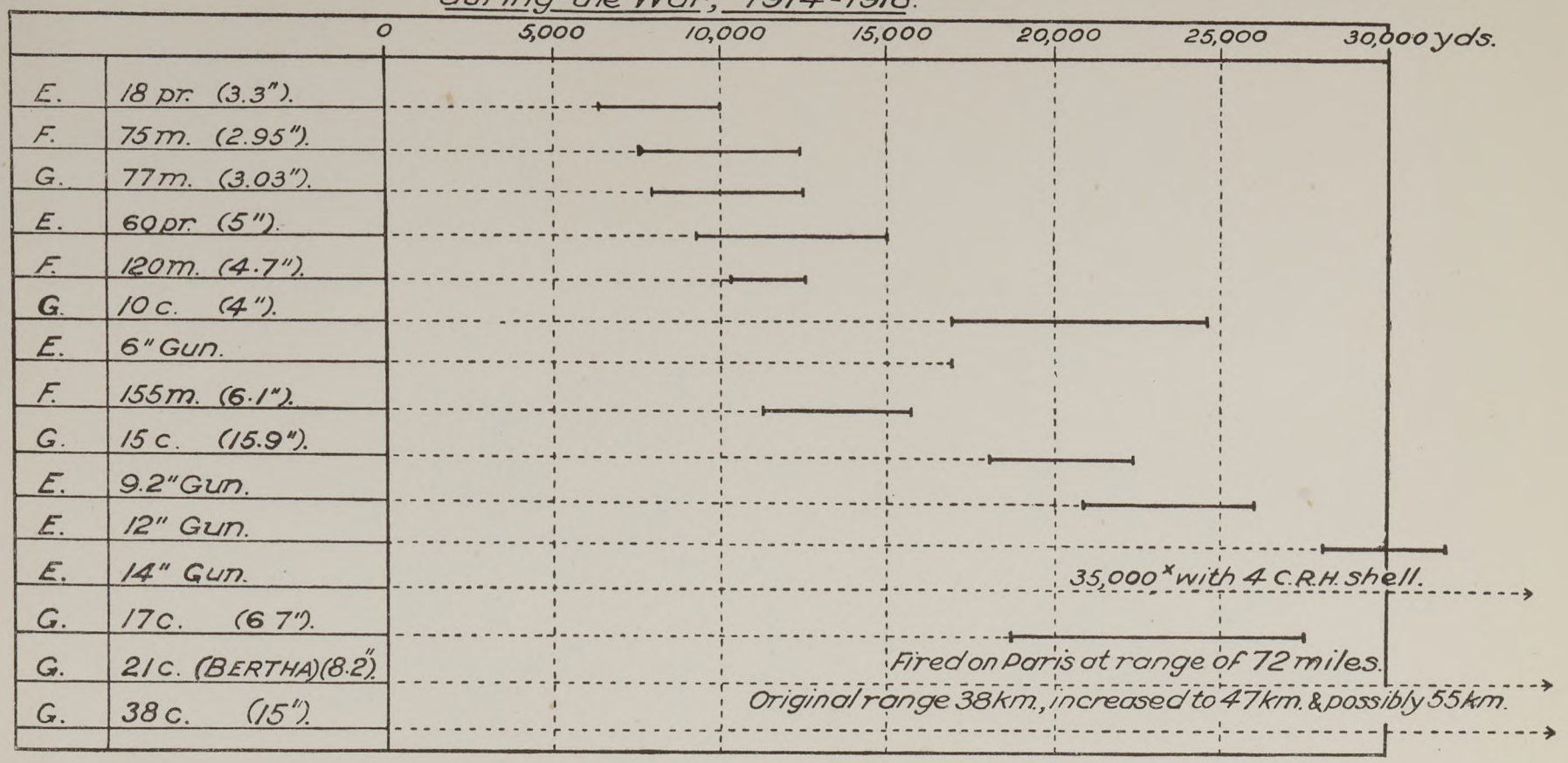
Approximate increase in Ranges of Guns. during the War, 1914-1918.

Appendix D.1.

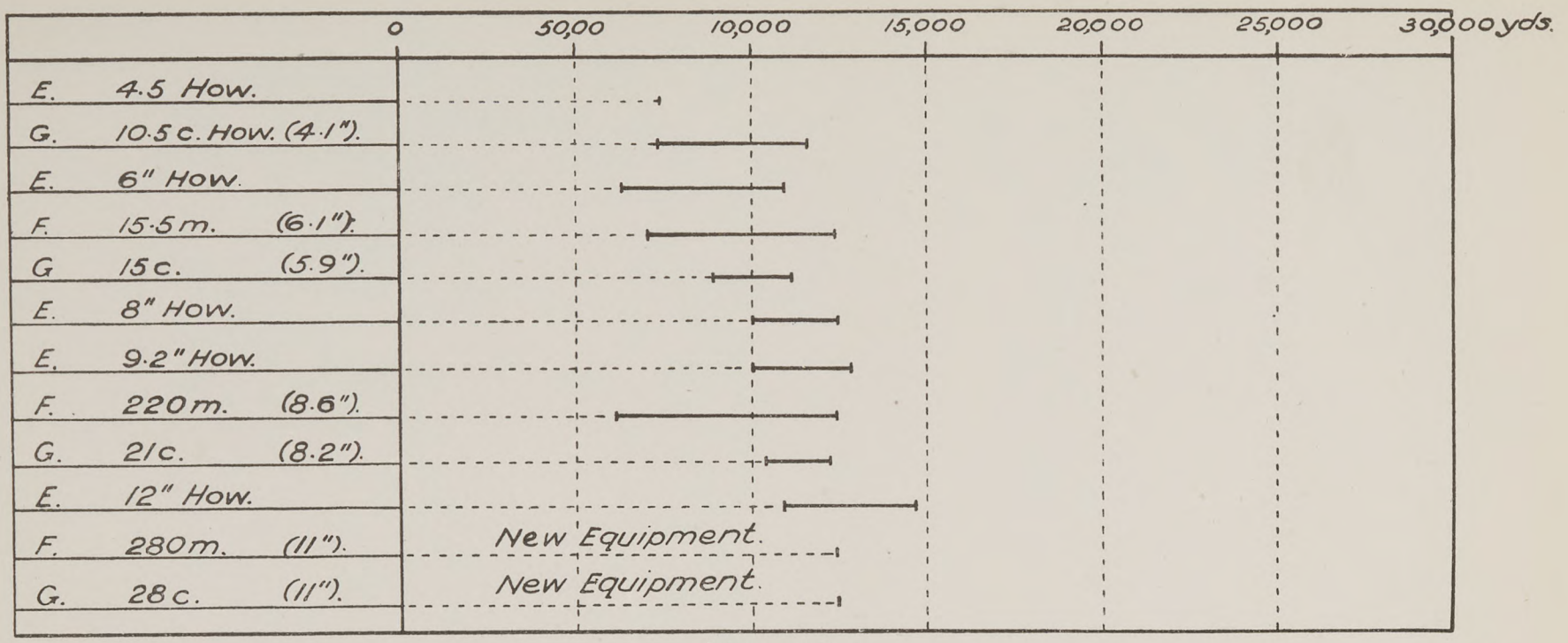


LEGEND.

E = England.
F = France.
G = Germany.

Approximate increase in Ranges of Howitzers during the War, 1914-1918.

Appendix D.2.



LEGEND.

E = England.
F = France.
G = Germany.

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Approximate increase in Ranges of Guns.

Appendix D.1.

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being finally interrupted by the Armistice. The important fact to notice is that although trench warfare was directly responsible for the revival of the mortar, the re-introduction of this weapon provided a suggested solution to the increasing difficulties of artillery close support in more mobile operations.

2. AMMUNITION.

(a) Shrapnel and H.E.

We started the war with only one type of ammunition for our field guns, namely shrapnel. With highly trained personnel, and the war of movement we were preparing for, there can be no doubt that our selection was correct. With the advent of trench warfare, and the lack of heavy equipment, the demand for high explosive shell soon made itself felt. By the 29th of October, 1914, a design of H.E. shell for the 18 pr. had been approved, although this shell did not materialise in any numbers till the battle of Loos. Barely had a steady supply of H.E. shell been assured, when the "Rolling Barrage" was introduced during the battle of the Somme, and shrapnel shell regained favour. The introduction of 106 instantaneous fuzes brought H.E. shell again into competition with shrapnel shell. Two distinct schools of thought were formed, each favouring one type of shell, and at the time of the Armistice opinion still remained divided as to the relative advantage of each type. In the 4·5″ how. and the 60 pr. the original proportions had been settled at 70% H.E. to 30% shrapnel. H.E. rapidly gained in favour for the 4·5″ how. equipment and ultimately replaced the shrapnel; whilst with the 60 pr. the lack of an efficient long-burning fuze handicapped the usefulness of shrapnel shell and consequently favoured the use of H.E. In the heavier natures of equipment H.E. was exclusively employed.

(b) Smoke Shell.

The introduction of smoke shell is of special interest as it provides us with one of the many landmarks in the introduction of the policy of neutralisation which followed that of destruction, and which we shall examine in detail when dealing with the evolution of artillery tactics. For the present it is sufficient to note that by August, 1916, it was realised that smoke shell for guns presented certain advantages, and a decision was arrived at to

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depart from the original policy of 1915 by which all efforts were concentrated on providing smoke bombs for the 4″ Stokes mortar. By November, 1916, 5000 smoke shell for 4·5″ how. had been received in France and had proved satisfactory. In February, 1917, the demand for smoke shell for France was settled at 20,000 rds. 18 pr. per week, and shortly afterwards increased to 30,000 rds. provided supplies of phosphorous were adequate. Owing to the shortage of 18 prs. existing at this time these figures were again altered to include 4·5″ hows. By November, 1917, it was decided that a weekly supply of 20,000 rds. 18 pr. and 6,500 rds. 4·5″ how. could be commenced by the Spring of 1918. Finally by September, 1918, the weekly requirements of smoke shell had been settled at 30,000 rds. 18 pr. and 20,000 rds. 4·5″ how., amounts which did not materialise before the Armistice. We therefore see that by February, 1917, a distinct demand for smoke shell made itself felt, by the Spring of 1918 smoke shell began to arrive in bulk, and by the Autumn of 1918 it was found necessary to endeavour to double the output, whilst the Armistice found us still short of our requirements. The above dates are worthy of notice, and bear a close relation to our change of artillery tactics, and to the advent of the tank.

(c) Gas Shell.

The first German gas attack at Ypres in 1915 naturally turned our attention to the use of gas. Priority however, was given to cylinder gas, whilst research was also directed towards the use of more poisonous gases contained in artillery shell. In July, 1915, the Germans made use of shells filled with a mixture of H.E. and lachrymatory gas, and our attention was consequently turned in this direction, at the expense of the lethal gases. Owing to the existing shortage of shrapnel and H.E. it was decided in August, 1915, that the supply of gas shell should in no way interfere with the normal natures of ammunition. By September, 1915, the first batch of 1000 rds. 4·5″ how. lachrymatory shell was delivered in France, 300 of which were issued to the First Army. It was not possible at this period to form any accurate opinion as to the value of these shells. By May, 1916 the weekly demands for gas shell for France had been settled at :—

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5000 rds.	.....	4·5″ how.
1000 ,,	.....	4·7″ guns.
4000 ,,	.....	60 pr. guns.

The above to be loaded with lethal gas if possible, failing which lachrymatory gas to be used.

From this date onwards demands gradually increased. The introduction of Mustard Gas by the Germans in July, 1917, provided the main stimulus to the use of gas through the medium of the artillery. By September, 1917, the weekly demands of gas shell for France had been increased to the following figures :—

	LACHRYMATORY	LETHAL	MUSTARD	TOTAL
18 pr.			50,000	50,000
4·5″ how.	7,500	7,500	15,000	30,000
6″ how.	10,000	4,000	36,000	50,000

The above requirements could not be met, especially as regards mustard gas, which only commenced to arrive in France during the Autumn of 1918 in the following quantities :—

18 pr. ... from end August, average 13,000 per week till Armistice.
4·5″ how. ,, ,, September, ,, 7,000 ,, ,, ,, ,,
6″ how. ,, ,, August, ,, 6,000 ,, ,, ,, ,,

Three important facts should be noticed with reference to the evolution of the employment of gas through the medium of artillery :—

(i) From the date of the decision to employ gas through the medium of artillery, the supply of shell of this nature never equalled the demand.

(ii) Mustard gas, the most efficient gas for artillery use, was only available for our use during the last 4 months of the war, its employment may consequently be looked on as still in initial stages of evolution at the time of the Armistice.

(ii) Although the Germans first made use of mustard gas in July, 1917, it was only by August, 1918, 13 months later, that we were able to reproduce this gas in sufficient quantities to justify its employment.

(d) Fuzes.

The evolution of fuzes naturally followed closely on that of

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guns and ammunition. Increased range affected time fuzes directly, and a gradual increase in the time of burning became a necessity. No drastic changes resulted from the war in this direction, and the Armistice found us still deficient of a suitable mechanical fuze. As regards percussion fuzes, however, the introduction of instantaneous fuzes, such as No. 106, marks a very distinct landmark in the evolution of artillery as a whole. By the introduction of this type of fuze the efficiency of H.E. shell against personnel and barbed wire entanglements was increased out of all proportion to the minor changes entailed. This new type of fuze had a direct effect on tactics, admitting of the destruction of entanglements at distant ranges, and conferring a far greater man-killing power on the heavier natures of artillery.

3. Accessories.

Our survey of the evolution of artillery equipment would be incomplete if we limited our outlook to the actual guns and ammunition, and failed to include the various instruments and methods employed in connection with artillery in order to increase its efficiency. For want of a better term, we can for the purpose of our present study, classify these various means and methods under the title of "accessories." In 1914 we were exceptionally free from such accessories, and only relied on range taking instruments, directors, plotting instruments and our telephonic and signalling equipment. During the Great War the continual call for an increase of artillery power led to the introduction of various additional accessories which directly affected its evolution.

(a) Air Observation.

When the war started the conquest of the air was still in its infancy and had in fact barely left its cradle. We had only examined the very fringe of the possibilities it offered as a new weapon of war. Aircraft in those days were scarce, and the few available machines were naturally regarded from the point of view of their use for general reconnaissance. The value of observation of fire from the air had been realised, but with the resources available, no serious co-operation with artillery was possible, and the question of inter-communication between aircraft and artillery still remained

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unsolved. In a few French corps attempts had been made towards closer co-operation, whilst in Germany, where more machines were available, co-operation had been carried a few steps further. Taken as a whole, no definite methods existed beyond the use of coloured lights or special evolutions of the machine, to indicate the presence of targets. The absolute necessity for close co-operation between aircraft and artillery was at once realised by all belligerents, and steps taken to produce the required organisation, equipment and methods. To follow this evolution would take us into the realms of the air and away from our subject; it will suffice, therefore, if we record the fact that by the end of the war aircraft were provided at the rate of one squadron per corps, and that these squadrons were mainly employed in close co-operation with the artillery. It should be noted that the evolution of the co-operation of aircraft with artillery never went beyond the actual observation of fire as opposed to control of fire. If we turn to the introduction of distant observation posts for artillery purposes in pre-war days, we find that in the initial stages these distant stations were used only for observation purposes, and that it was in the subsequent stages of evolution that the actual control of fire was transferred to the observation post, in the first place the technical control and secondly the tactical control. It remains, therefore, for the future to decide whether the co-operation between aircraft and artillery is to be carried forward through the subsequent stages leading to control of artillery fire from the air.

There can be no doubt that the situation prevailing at the time of the Armistice is an unsatisfactory one from an artillery point of view. We have entrusted our eyes to another service, and unfortunately the branch of this service controlling these eyes must necessarily occupy a secondary position when compared to the fighting branches of this service. We were fortunate enough not to suffer from this defect during the war, but our allies the French were seriously affected. In his recent book General Herr states that he considers that the French observation from the air reached its maximum efficiency in 1916, from 1917 it commenced to decline, and by 1918 was verging on complete inefficiency. He attributes the main cause of this trouble to the fact that the natural glamour of the fighting squadrons, combined with a freer distribution of

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decorations in this branch, was naturally drawing all the best material away from the observation squadrons.

(b) Telephone and Wireless.

We have seen that in our pre-war conception of a mobile war, an extensive use of the telephone, as a means of inter-communication, could not be contemplated. As a result the equipment provided fell far short of the requirements entailed by a static war. In the case of the French army the situation was even worse, the necessity for extra equipment became so urgent that private houses and factories were ransacked for instruments of every description, and one corps commander went so far as to send a staff officer to Paris with special instructions to purchase everything he could find in the nature of telephonic equipment. Lack of previous training in the handling of complicated telephone systems naturally led to a period of confusion amongst artillery telephone lines, whilst hostile artillery fire added materially to the destruction of such communications. Gradually order grew out of disorder, main buried trunk lines were employed, combined with intricate systems of exchanges, and as a result the artillery power available was proportionately increased. The constant liability to interruption of communications existed till the end. Marvels were done by telephonists and linesmen in maintaining communication through shell-swept areas, but something better was required. It is not surprising, therefore, that constant endeavours were made to render wireless intercommunication suitable for artillery purposes. A few instruments were issued to the artillery in 1917, but by the time of the Armistice only limited progress had been accomplished in this direction, owing to the impossibility of training the necessary personnel during the stress of war, and the difficulties of handling such delicate equipment in the field of battle. The Armistice consequently left us with the telephone developed to a high state of efficiency for use in the field, and wireless still in its infancy, but with a brilliant future in front of it.

(c) Flash Spotting.

Prior to the war cross observation of fire had already been employed with the heavier natures of artillery. It is therefore not surprising that as soon as operations admitted of it, attention was

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directed to the advantage gained by combined observation from two or more observation posts centrally controlled. By 1915 observation sections of the Field Survey Companies R.E. were formed with the object of establishing systems of combined observation for locating and intersecting the flashes of hostile guns. Both methods and instruments were gradually improved, and by the time of the Armistice the flash spotting sections had become a thoroughly reliable organisation providing a large proportion of the counter-battery intelligence. These sections, however, suffered from one serious fault, namely lack of mobility; born and bred during the period of static warfare they had been left deficient of the necessary transport required to render their employment possible during the more mobile phases of operations. The defect became apparent in 1918 and was in process of adjustment when the Armistice came.

(d) Sound Ranging.

It is only natural that our attempts to locate hostile guns by intersecting the flashes should turn our attention to the possibility of intersecting the report through the medium of sound waves. In 1915 rudimentary attempts were made, consisting of a certain number of observers provided with synchronised stop watches, and placed at various points along the front. It was soon realised, however, that the measurements of time required were far too delicate to be arrived at by such a crude method. Various types of machines were tried, but no distinct progress was made until the Tucker microphone was invented. Towards the end of 1916 a few experimental stations were established, which proved so successful that by 1917 a regular system of sound ranging sections was established along the front which added materially to our sources of counter-battery intelligence. Although originally designed for the purpose of locating hostile guns, it was found that the usefulness of the new instruments could go one stage further and be employed for actually ranging the heavier natures of ordnance, by intersecting the noise of the bursting shell and reporting the fall of the shell with reference to the site of a previously located active hostile gun. The introduction of flash spotting and sound ranging sections

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exercised a direct bearing on artillery tactics, it became not only necessary to conceal battery positions from sight, but also from sound! As a result any registration of guns prior to an attack was certain to disclose our intentions, and in the defence any previous activity rendered battery positions liable to neutralization during the hour of attack. The influence exercised by these two new accessories must consequently be borne in mind when we turn to examine the evolution of artillery tactics.

(e) Screen calibration.

We may now turn to three accessories which are directly connected with the question of the accuracy of unobserved fire. In the first place some method was required for measuring the loss of efficiency of equipments due to wear. This could, of course, always be done by the actual shooting of carefully observed rounds, but facilities did not always admit of such action, and the tactical situation often precluded this possibility. Towards the end of 1917 special screen calibration sections were consequently formed, by means of which guns could be fired through screens behind the line, and both muzzle velocities and jump measured. The formation of these calibration sections played a distinct part in rendering possible the unregistered artillery support in the surprise attack of 1918.

(f) Meteor Reports.

The effect of temperature, barometer and wind on the trajectory of guns was well known in 1914, but with observed fire corrections were automatically applied. It was not till unobserved fire became essential that we found ourselves confronted with the necessity for accurate meteor reports. By the end of 1916 a system had been introduced by which such reports were automatically distributed to all artillery units at stipulated times in the day. Necessary as such reports were for counter-battery work and harassing fire during 1916 and 1917, they became of vital importance in the surprise tactics of 1918.

(g) Artillery Survey.

The direct bearing which survey work would exercise on artillery had not been realised before the war. Range takers were

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considered as the correct means to employ in arriving at an estimate of the distance of the target from the guns. It was not many years before the war that a certain battery commander at one of our practice camps was considered to have employed underhand methods by measuring ranges off the map! When the war came the range takers rapidly disappeared and our attention was directed to the map. The necessity for accurate maps was at once apparent, enlarged maps were also necessary, and finally gridded maps were required to ensure co-operation between the various arms. Difficulties still existed, both battery positions and targets required careful resection, and artillery personnel had up to that time not received adequate training in the rudiments of survey work. In times of peace this defect could have been easily remedied, but during the stress of war and with constant wastage to contend with, it was more economical to keep specialists for this task. Special survey sections of R.E. personnel were consequently formed, and together with the flash spotting and sound ranging sections, formed the artillery company of the R.E. Survey Battalion of each Army.

4. Conclusion.

The hasty survey which we have just completed of the evolution of artillery equipment during the war, can only provide us with the mere outline of a subject which would require a complete treatise in itself. There are no doubt a multitude of further points of interest which should be referred to, but for our present purpose a closer study of the subject might defeat its own end, we might well lose sight of the forest for the trees. Certain definite factors in the evolution of equipment exercised a direct effect on the evolution of artillery power as a whole; it is these very factors on which we must concentrate our attention, with the object of examining their influence on artillery power, and to assist us in drawing deductions as to the future lines of artillery evolution.

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ARTILLERY TACTICAL PROBLEMS.

By Bt. Lieut.-Colonel E. C. Anstey, d.s.o., R.A.

IN the May number of the R.A. Journal an unsigned article was published which drew attention to the subject of Artillery Tactical Problems and to the manner in which plans for their solution should be formed. Mention was made of the little pamphlet entitled "Notes on Elementary Tactical Problems" which has been issued officially as a guide to the tactical training of infantry platoon and section commanders. Further light has been thrown on the formation of artillery plans in the report on the promotion examination for April 1924. These three authorities—the article, the pamphlet and the report—if woven together, form an exposition of artillery minor tactics which, at the cost of some repetition, is worthy of reconsideration. If the reader turns to them he will see that the article lacked practical illustrations; the pamphlet requires some small adaptations for artillery purposes; and the limitations of the report prohibited explanations of the steps by which the solution should be reached.

It is remarkable that the subject of artillery tactics has not received as much attention as it deserves. This is due perhaps to some confusion of thought concerning the definition and scope of artillery tactics. Artillery officers receive instruction annually in the handling of small mixed forces employed as outposts, advanced guards, and rear guards and in attack and defence. On the miniature range and at practice camps problems of fire tactics are brought before them. But the artillery tactical employment problem had often escaped attention until the examination paper set in April brought it to the fore. That paper propounded three examples and showed clearly the importance of realising the existence of such problems when they present themselves and of approaching them in the manner best calculated to provide a sound solution.

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Now an artillery tactical problem presents itself to every artillery commander (whether divisional, brigade, battery or section) who is allotted a task in battle. The problem consists in answering the question, how can this task best be carried out? The answer constitutes the Artillery Plan.

Before the plan can be formed the situation has to be considered from the artillery commander's point of view just as any other tactical situation has to be appreciated, and just the same kind of factors have to be weighed. While bearing in mind the object to be attained, the commander passes in review the influence of the enemy's action, of that of our own troops and of the various features of the ground in order to arrive at conceptions of alternative plans, from which, in the light of all the factors in the case, the best can be selected. In fact the procedure laid down in the Appendices to the "Notes on Elementary Tactical Training" can and should be followed almost in its entirety.

In the May article the anonymous writer traced out this procedure in brief but did not apply it to a concrete case. I propose therefore to treat the problem given in the promotion examination paper (Question 3, Employment Paper E iii) in the same manner and so to trace the steps by which the solution suggested by the examiner should be reached. For the benefit of those who have not got the report on the promotion examination before them, an outline of the situation to which the question refers, illustrated by a rough sketch map, is as follows.—

The Advanced Guard of an EASTLAND Force is pursuing an inferior WESTLAND Force which is retreating in a south-easterly direction.

Strength of Advanced Guard.

Mounted Troops.	1 Troop Cavalry.
Vanguard.	1 Company Infantry,
Mainguard.	1 Company Infantry.
	1 Section 3·7″ hows.
	1 Battery 4·5″ hows.
	"A" Infantry Bn. (less 2 Companies).

At 0730 hours O.C. WESTLAND Advanced Guard at the head of the Main Guard at the southern corner of BULL BUSHES COPSE

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(Q 08) learned that the vanguard was held up by opposition from the high ground and woods east of the old Roman road (WINCHESTER to SILCHESTER). Going forward with O.C. Advanced Guard Artillery to the spur just south of BEECH AVENUE (in SOUTH WOOD Q 27) he discovers that the enemy, estimated at 2 infantry companies with machine guns, had been located (a) in the western end of COACHROAD BELT, (b) at KEMPSHOTT HOUSE and (c) in the western end of PEAK COPSE. WESTLAND vanguard were all west of the Roman road between GREAT STUBBS COPSE and GANDER DOWN COPSE. WESTLAND Cavalry patrols were reconnoitring in the direction of TOWER HILL FARM (Q 25) and DOWN GRANGE COTTAGES (Q 49).

The O.C. Advanced Guard said he proposed to attack at 0830 hours PEAK COPSE and the high ground immediately south-west of it with one battalion, on a frontage of about 1000 yards. He asked the O.C. Advanced Guard Artillery whether this plan would suit him from the point of view of giving effective artillery support, and the questions were (a) What would you answer and why? and (b) How would you dispose your guns and what tasks would you give them in support of the attack?

The report on the examination gives a full answer to (a). It is with the steps by which the answer to (b) is reached that I wish to deal.

As soon as the O.C. Advanced Guard, in consultation with the O.C. Advanced Guard Artillery had decided on his general plan of attack and had issued orders accordingly to his battalion commander, the artillery commander consulted with the latter and heard how he proposed to carry out his orders in detail. In particular he required to know the tasks to be allotted to the battalion machine guns. Without entering into consideration of the factors on which the infantry plan of attack was based, it is assumed that the details of the plan in brief were as follows:—

"A" Co. (present vanguard Co.) to assemble in reserve as soon as the attack has passed over them.

"B" Co. from head of Mainguard via west edge of DEAN HEATH COPSE to N.W. corner of Q 16 and attack thence Eastwards, left on S. corner of PEAK COPSE right on GLEBE BARN, both inclusive.

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"C" Co. to move via SOUTH WOOD to GANDERDOWN COPSE and attack with left on Tumulus (inclusive) right on S. end of PEAK COPSE (exclusive).

"D" Co. to move in support of "B" Co. to valley N.E. of NORTH WALTHAM and then move generally eastwards, echeloned 1000 yds to "B" Co's right rear, with the intention of developing a flanking movement from the South in support of "B" Co. should that company be held up.

M.G. Platoon. One section to support the attack on PEAK COPSE from the neighbourhood of GREAT STUBBS COPSE with 2 guns, the other 2 guns enfilading the road leading to GLEBE BARN. One section to support the right attack from spur N.W. of GANDERDOWN COPSE with 2 guns and the left attack with the other 2 guns.

Timing of attack. "B" Co. to cross ridge in N.W. corner of Q 16 at 0830; "C" Co. to advance to attack when "B" Co's leading men cross the Roman road.

Battalion H.Q. on ridge S.W. of Point 164.3.

The O.C. Advanced Guard Artillery, while studying the problem with the infantry commander from the map and from the ground, noted the following points:—

(a) From the position of the enemy's infantry already located towards the bottom of a long slope with fairly short and somewhat broken fields of fire, it was evident that they were not merely a rearguard but must represent the forward zone of a defensive position resting on the high ground lying between BROADMERE and NUTLEY WOOD, about 4000 yards from the point he was standing at. The artillery must therefore be placed to support if possible a further development of the action than the attack of the battalion as now planned.

(b) From the map he could not tell to what extent the trees of GANDERDOWN COPSE would obstruct the view of an observer on the 164.3 ridge who was watching the advance of the infantry against PEAK COPSE and he moved a little way along the ridge to judge the amount of obstruction.

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He then appreciated the problem from the artillery point of view as follows:—

My OBJECT is (a) to support the infantry attack on PEAK COPSE and 1000 yds. to the south of it, and (b) to be well placed at the same time to support further developments of the action.

The ENEMY are standing on the defensive and resistance must be expected (i) at various points in the woods of the KEMPSHOTT area backed by covering fire from the main ridge BROADMERE—MANOR FARM; (ii) West edge of ROWLEY COPSE; (iii) Old Chalk Pits near GLEBE BARN; (iv) DUMMER; (v) possibly TIDLEY HILL and certainly some point on the TIDLEY HILL ridge. The field guns must be disposed to cover as many of these points as possible. Hostile counter-attack in the KEMPSHOTT PARK area will be easy to arrange and difficult to detect from a distance. The pack guns must be prepared to act eventually in very close support in this area. The enemy's guns are doubtless behind the BROADMERE—NUTLEY WOOD ridge only 3000—3500 yds. from the 164.3 ridge. Thus it will be advisable, if the field guns cannot be hidden to disperse them and to avoid crests provided the support of the infantry does not suffer thereby. The KEMPSHOTT HOUSE garrison flanks PEAK COPSE and must be dealt with prior to and during the attack: also the west end of COACHROAD BELT from where the enemy can put enfilade fire down the front of PEAK COPSE. The enemy will also certainly be found in DUMMER. The howitzer battery should therefore try and get some observed fire on it.

As regards OUR TROOPS, as the machine guns will be able to enfilade the edge of PEAK COPSE we will open our fire by sweeping up the copse from the interior towards the edge; and searching the GLEBE BARN hollow. If the action becomes general, the artillery of our main body will be soon in action and will undertake counter-battery work which I need not therefore provide for. If the attack is held up, our infantry are sure to develop a flanking movement via DUMMER. Some guns must be well placed to support such a movement.

From a study of the GROUND it is obvious that favourable artillery positions exist along the 164.3—GREAT STUBBS COPSE ridge with good approaches to it and satisfactory O.P's. But this ridge is sure to be under the enemy's artillery fire. Nevertheless my guns will

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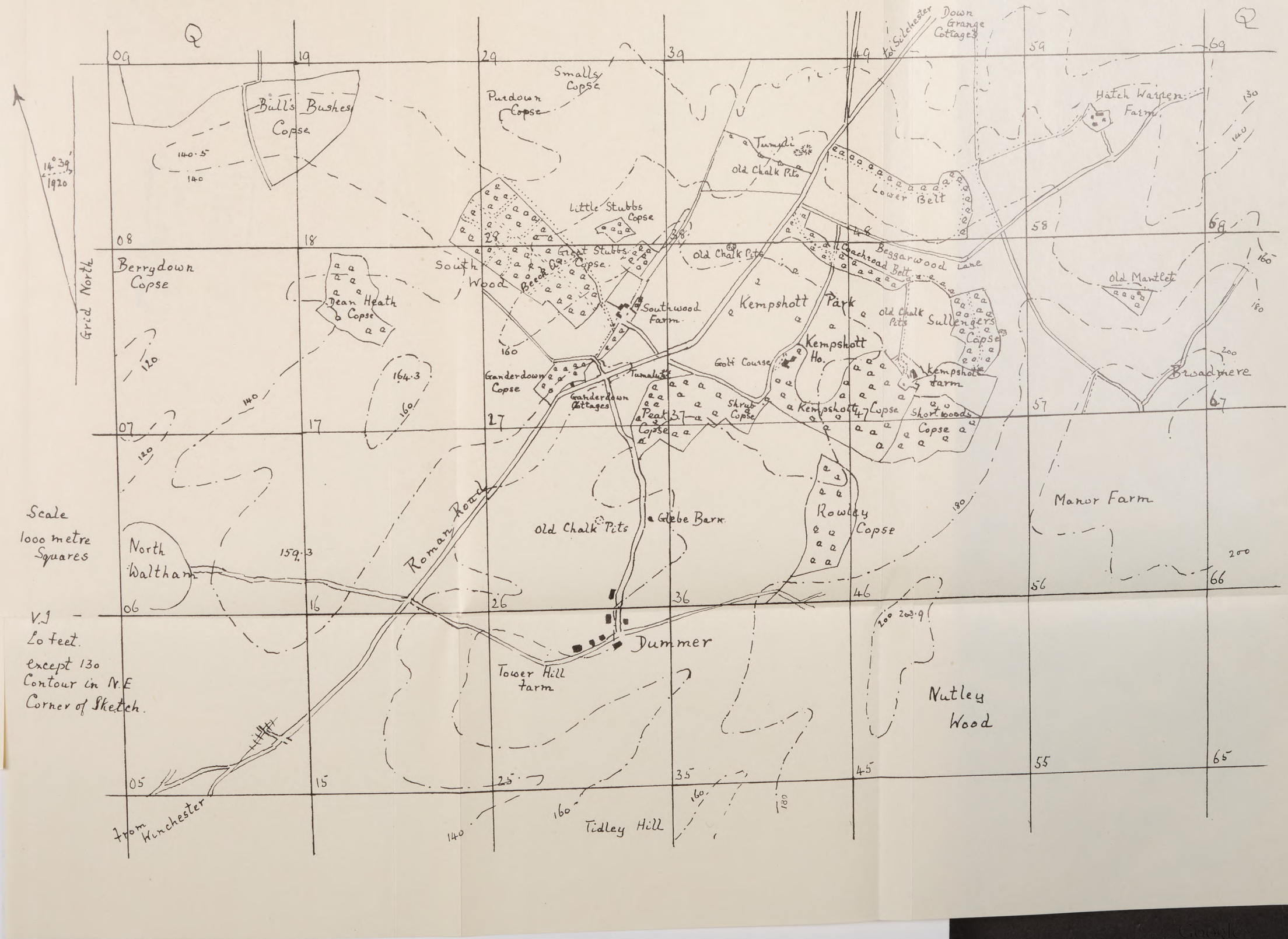
Q
Q
Grid North
14° 39'
1920
Bull's Bushes Copse
Purdown Copse
Smalls Copse
Little Stubbs Copse
Great Stubbs Copse
South Wood
Beech Q.
Berrydown Copse
Dean Heath Copse
Southwood Farm
Ganderdown Copse
Ganderdown Cottages
Tumulus
Peak Copse
Shrub Copse
Kempshott Park
Kempshott Ho.
Golf Course
Kempshott Copse
Kempshott farm
Shortwoods Copse
Coachroad Belt
Beggarwood Lane
Old Chalk Pits
Tumuli
Lower Belt
Sullengers Copse
Old Mantlet
Hatch Warren Farm
Down Grange Cottages
to Silchester
Broadmere
Manor Farm
Rowley Copse
Glebe Barn
Old Chalk Pits
Roman Road
North Waltham
Dummer
Tower Hill farm
Nutley Wood
Tidley Hill
from Winchester
Scale
1000 metre Squares
V.I
20 feet.
except 130 Contour in N.E Corner of Sketch.

lery positions exist along the 164.3—GREAT STUBBS COPSE ridge good approaches to it and satisfactory O.P's. But this ridge is to be under the enemy's artillery fire. Nevertheless my guns

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have to be well up to the crest for the ranges will be short. I can only meet the danger by dispersal along the 164.3 portion of the ridge or by bringing them in on the ridge further back in Q 07; and on the left by utilising the important little spur N.E. of SOUTHWOOD FARM from which close observation can be obtained on KEMPSHOTT HOUSE and PEAK COPSE, with the guns concealed in a hollow close by.

A close examination of the ground and map reveals the following points:—(i) From the edge of PEAK COPSE the enemy cannot see the edge of GANDERDOWN COPSE. The attack issuing thence will not come into the enemy's view until it reaches approximately the line of the 145 contour. (ii) The enemy will see "B" Co. coming over the 164.3 ridge at a range of 1700—1800 yds. and will lose sight of them as they drop into the valley approximately at the 140 contour (1000 yds). (iii) PEAK COPSE can enfilade the OLD CHALK PITS spur along the 150 and 155 contours although their view will be hindered by hedges. But by the time "B" Co. reaches that line "C" Co. should be at close grips with PEAK COPSE and occupying all its attention. (iv) On the other hand there must be several points on the OLD CHALK PITS spur from which the front of PEAK COPSE could be enfiladed. This spur must be closely examined and watched by observers, and one or more points on it registered.

What ALTERNATIVE PLANS are there therefore for the attainment of my object? A rapid move into action and preliminary ranging while the infantry are moving into position are the first steps. For the A.G. commander has agreed that there is no objection to this, the element of surprise being absent. Also, generally speaking, the pack artillery must operate N.E. of SOUTHWOOD and the field battery S.W. But should I:—

(a) put the field battery back near BERRYDOWN COPSE with an O.P. near point 164.3? I do not think so; for to give the infantry the accurate and close support they require, voice control or at least a very short line of communication is essential.

or (b) place the field battery in a semi-covered position on ridge 164.3?

or (c) disperse the field battery along that ridge.

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I am in favour of dispersal (i) to avoid to some extent hostile artillery fire; (ii) to have a section far enough along the ridge to shoot into DUMMER when required.

Further, having dispersed the field battery in this manner, am I to:—

(d) put the section of pack artillery near GREAT STUBBS COPSE,

or (e) send the section to accompany the infantry attacking from GANDERDOWN COPSE? In this I see no advantage. The view of the attack obtained by the B.C. from N.E. of SOUTHWOOD FARM will be so good and his fire will be so in enfilade that, if it is required, he can give better support than guns accompanying the infantry.

My PLAN therefore has taken shape as follows:—The field battery to move into action at once with one section semi covered on the 164.3 ridge with an O.P. close by; the other section towards Point 159.3 (E. of N. WALTHAM). The OLD CHALK PITS SPUR will be brought under close observation and points on it registered. Before the infantry advance begins both sections will sweep PEAK COPSE from the interior towards the edge and try to induce the enemy to come out into the open in view of the M.G's. They will also put a few shells into COACHROAD BELT.

The 3·7″ hows. to move via SOUTHWOOD and come into action at SOUTHWOOD FARM. O.P. on ridge 300 yds. east of battery position.

During the attack the 4·5″ hows. will shell PEAK COPSE holding one section ready to turn onto any enemy located on the OLD CHALK PITS SPUR. The 3·7″ hows. will bombard KEMPSHOTT HOUSE.

After the infantry have reached PEAK COPSE the field battery will engage targets south of PEAK COPSE; the 3·7″ hows. will afford close support to the infantry advancing through it, pushing one gun forward if necessary.

The artillery commander finishes by assuring himself that his plans conform to the objects he set out to attain at the beginning of his appreciation.

We have thus arrived at the solution propounded in the report.

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It will, I think, be generally admitted that such close consideration of all the factors in the case is unusual. A battery commander faced with a similar problem is liable to search instantly for an O.P. from which to obtain a view of the ground the infantry attack is to traverse and bring his battery into action without delay to cover the same area. It is seldom that such lack of forethought will not prejudice the support of the guns at some period of the fight. There must always be many alternatives for the artillery commander to select from. For instance, as regards the entry in action, the choice will lie between :—

Awaiting further developments if the enemy has not been located.

Remaining in a position of readiness.

Remaining in a position of observation especially when surprise is aimed at.

Bringing a portion of the battery into action. (Economy of Force.)

Dispersing the sections.

Bringing the battery into action and registering.

Bringing the battery into action and trying to shell the enemy out of position before the infantry attack begins.

Similarly will many alternatives be found to present themselves under all the headings that constitute the plan—the advance into action, disposal of wagon lines, means of communication, methods of liaison, nature and intensity of fire and local and anti-aircraft protection. The translation into action of the plan thus formed by the issue of orders, simultaneously if possible, to the subordinates concerned rounds off the methodical procedure and ensures, so far as is possible, the continuity of artillery support on preconceived lines whatever casualties may occur. The battery or section commander, incapacitated even as he reaches his O.P. may console himself as he is carried to the rear by the thought that after the brief delay required for the next subordinate to take his place, the action of his command will pursue its way as he would wish it.

In order to appreciate the scope of the artillery plan even of a section and the extent of the orders required for its fulfilment,

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let us examine a problem arising out of a further situation occurring in the April promotion examination. The attack on PEAK COPSE failed and was renewed by two fresh battalions, one on each flank. On the left the battalion reached the line road-junction 200 yds. N.W. of the first C in COACHROAD BELT to SHRUB COPSE both inclusive, but were checked on trying to advance to their 2nd objective, namely the line B in BEGGARWOOD LANE—KEMPSHOTT FARM—southern end of track that divides KEMPSHOTT COPSE from SHORTWOODS COPSE. The opposition was principally heavy M.G. fire from (a) the western end of SULLENGER'S COPSE; (b) KEMPSHOTT FARM outskirts; and (c) the northern end of ROWLEY COPSE. A 3·7″ howitzer battery was detailed for the support of the further advance of this battalion, and in the solution suggested by the examiner the battery commander having persuaded the battalion commander to concentrate on the capture of SULLENGER'S COPSE, because of the superior artillery support he could give him there, decided to put one of his sections in action under cover on KEMPSHOTT PARK golf course to deal with targets on the north flank of the infantry attack and the other section in the western end of COACHROAD BELT to deal with targets on the south flank. The north side of COACHROAD BELT and the clearing east of KEMPSHOTT FARM were to be smoked for two minutes before zero.

This crossing of fire and observation has much to commend it. Let us suppose, however, that the left company commander ("A" Coy.) who was with the battalion commander when the above arrangement was made, pointed out that he would probably decide to try and reach his objective (SULLENGER'S COPSE) by means of a flanking movement under the northern slope of the spur and that accordingly it was on that face of the hill that he would prefer to have artillery support. The battery commander complies by directing his right section to co-operate closely with "A" Coy. in accordance with the company commander's wishes.

The action of the pack artillery section commander is now as follows:—He begins by making sure that he understands his orders: and then asks for any further information regarding his own troops and the enemy that he may require.

His orders are clear. He might ask some such question as under regarding his own and the hostile troops:—

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(a) What signallers and N.C.O's he may take with him.

In most pack batteries there are standing orders about the allotment of signallers etc. on the detachment of a section in which case this question will be unnecessary.

(b) Will the B.C. be remaining with the battalion headquarters and if so where will they be?

Answer. Yes. Bn. Hd. Qrs. remains where it is until the objectives are captured when it will move to the OLD CHALK PITS 300 yds. N. of KEMPSHOTT FARM.

(c) What is the action of the battalion M.G's to be?

The battalion commander replies that he has allotted 2 M.G's to the extreme right of his line (S. edge of KEMPSHOTT COPSE): 2 are being placed in KEMPSHOTT PARK so as to enfilade the northern edge of SULLENGER'S COPSE: 2 will fire on KEMPSHOTT FARM from somewhere in COACHROAD BELT: and 2 are placed at the disposal of "A" Coy. to assist their flanking movement.

(d) Does the B.C. know whether any hostile O.P's have been located on the BROADMERE ridge? This is important to know in order that the section may be kept out of sight of such points as far as possible.

Answer. None located.

(e) Are tanks to be expected to co-operate in a hostile counter-attack?

Answer. Tanks have not actually been located but they must always be allowed for.

(f) What is "A" Company Commander's plan of attack?

"A" Coy. Commander cannot say until he has carried out his reconnaissance on which he invites the artillery section commander to accompany him.

The artillery section commander, company commander and M.G. half-section commander now proceed to the neighbourhood of the TUMULI (N. of the W. end of COACHROAD BELT) and "sit down and think out with the map their best course of action. This enables them to get a general grasp of the situation." (See App. A, para. 3.)

As a result of this collaboration followed by the mounted reconnaissance executed by the two mounted officers the company com-

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mander decides, let us say, on the following plan of attack. One platoon (No. 1) will move along the north side of COACHROAD BELT, with the 200 yds. of hedge projecting in a N.W. direction from the N.W. corner of SULLENGER'S COPSE as their objective. Two platoons will round the shoulder below the TUMULI into LOWER BELT and make their way along it, one platoon (No. 2) attacking from about the corner above the E of BELT against the western half of the north face of the copse, the other (No. 3) continuing to follow the belt and, with its right in the belt, attacking the eastern half of the N. face. The company commander with the reserve platoon (No. 4) will follow No. 3 (the left platoon). The M.G. commander considers that his best action will be to enfilade No. 1 Platoon's objective from near the fence just south of the TUMULI.

The artillery section commander has to form his plan, for which his consultation and reconnaissance with the company commander has supplied sufficient data. He follows the procedure given in App. B and his thoughts run as follows:—

MY OBJECT is to support "A" Company's attack in the north face of SULLENGER'S COPSE, to protect them on reaching it from counter-attack, and to be prepared to support their further advance if ordered.

The ENEMY has been located, with M.G's, in the N.W. portion of SULLENGER'S COPSE from which he developed most effective fire along both N. and S. sides of COACHROAD BELT as far as the KEMPSHOTT HOUSE line on which our infantry now are. But from that position he cannot see below the 165 contour except into the hollow where the word BEGGARWOOD is on the map and there he cannot see further than the 160 contour. Nor can the enemy's O.P's on the main ridge see much better into that hollow. Nos. 2 and 3 Platoons are not likely to be interfered with in their advance except in the last three or four hundred yards of their attack unless there are enemy either in LOWER BELT or on the spur just N.E. of SULLENGER'S COPSE. The enemy position in fact may run as far as HATCH WARREN FARM. But fire from there can scarcely interfere seriously with the company's advance. What requires close watching is the possibility of a hostile counter-attack from the N.E. over the spur N.E. of SULLENGER'S COPSE. This is the most probable direction from which assistance can reach the enemy, for

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the concave slope of the BROADMERE ridge is open and in full view of our field artillery.

OUR TROOPS cannot assist the flank attack except with the M.G. fire in enfilade arranged for onto the N.W. face of the copse, and the M.G. covering fire from the affiliated guns. I can co-operate with them by arranging to put alternate bursts of fire onto the copse, say three rounds gun fire followed by a burst of M.G. fire. No. 2 Platoon must arrange to indicate to me their progress up the final stretch of LOWER BELT by signalling from its western edge. This cannot be observed by the enemy. No. 1 Platoon, moving along the north side of COACHROAD BELT has the role of holding the enemy's attention and preventing any movement to meet the flank attack. I must try and support them in this. Our field guns could assist in meeting a counter-attack over the spur N.E. of the copse.

As regards the GROUND the spur N.E. of the west end of COACHROAD BELT gives good observation of the objective and of the route of the Company towards it. No move forward will be necessary or advisable unless the flanking movement is continued via OLD MANTLET, when an advance to the spur N.E. of the copse would become necessary. I can get voice control from near the TUMULI and, by putting signallers on the north edge of LOWER BELT, I can communicate with the company commander without being exposed to view of the enemy. There is a good covered approach for my guns. When an advance is necessary the slope just south of LOWER BELT is concealed from the BROADMERE ridge.

I have no ALTERNATIVE, therefore, but to bring both guns into action near the TUMULI and support the infantry from there unless opposition is met with in LOWER BELT when I might have to push one gun forward to close range. I might register successive points of LOWER BELT and the spur beyond during the first stages of the advance or else try to assist No. 1 Platoon forward. This latter course is best especially as the flanking movement may effect a surprise and it will be better not to call attention to it. On the capture of the objective I might move forward to SULLENGER'S COPSE. But the range will be very short: the enemy are not likely to use tanks against a wood: and I can cover my infantry well by remaining where I am.

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MY PLAN is accordingly as follows:—

(a) To bring both guns into action in the neighbourhood of the TUMULI, close to the crest so as to get voice control if possible.

(b) To send one of my sergeants with a signaller to accompany the company commander and keep me informed of his movements and wishes and of the developments of the action.

(c) To keep the mules of one sub-section close enough to allow me to push one gun forward rapidly if required.

(d) To ask the B.C. whether field artillery fire can be arranged on the spur N.E. of SULLENGER'S COPSE as soon as my shell (including 2 smoke shell) are seen falling on it, but not before.

(e) To support No. 1 Platoon's advance with bursts of fire on the edge of the belt in front of them until Nos. 2 & 3 Platoons are about to come into the enemy's view when I will put crashes onto the copse.

(f) To arrange for the close observation of Nos. 2 & 3 Platoons' progress while I am engaged in supporting No. 1 Platoon.

The reconnaissance hitherto carried out by the artillery section commander has been a tactical reconnaissance to enable him to decide on his plan. If it has not yielded sufficient data to enable him to decide on the actual position of his O.P. and guns he must proceed with a technical reconnaissance. Meanwhile he has moved his section to a rendezvous under cover and can summon his subordinates to issue his orders in view of the ground. The orders given to his Nos. 1, signallers, Lewis guns, N.C.O. i/c wagon lines and any look-out men or observers he may be in the habit of using will be sufficiently obvious from the plan detailed above. The advantages of issuing his orders simultaneously in view of the ground are obvious.

The important point to grasp is that a tactical reconnaissance must precede the technical reconnaissance though sometimes the two can be done simultaneously. In such case the tactical deductions must precede the technical decisions. Artillery commanders of all ranks must look further ahead than they have perhaps been

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accustomed to. The instinct to bring their guns into action at once on receiving a task in battle without proper consideration of the situation must be resisted. It may occur that on reflection it will be seen that the position is too obscure to justify committing any guns to action at all: that the presence of the enemy in any strength is doubtful, let us say: that the best plan will be to follow the infantry up. Many alternatives will often present themselves and without proper consideration the best cannot be selected.

Officers interested in the subject of artillery tactics may like to know that a similar article to the present one with two different and fully worked-out examples appears in the January number of the Journal of the R.U.S.I., India.

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PACK ARTILLERY—PRESENT AND FUTURE.

By Captain H. M. J. McIntyre, R.A.

IN order to examine the lines along which development of pack artillery is likely to be expected in the future, it is necessary to review briefly the rôles assigned to it at present, its ability to carry them out, and any probable modifications necessitated by changes in armaments, progress of science, etc. The rôle of pack artillery as at present defined may be briefly summarised as:—

(a) Close support of infantry, i.e., gun of accompaniment.
(b) Anti-tank defence.

Besides these special rôles it has also to be ready to carry out any of the tasks which are the normal work of the divisional artillery.

Close support of infantry.

In order to save confusion of thought, it is as well to differentiate clearly between "guns of accompaniment," and "guns in direct support of infantry."

"Guns of accompaniment" have been very clearly defined as "batteries and sections handed over by the divisional artillery, and placed under the direct command of an infantry brigade or battalion commander, on a scale that would normally not exceed two guns per battalion in the front line. The gun of accompaniment is purely a weapon of opportunity, and reinforces the battalion's own weapons in breaking down local resistance."

"The guns of accompaniment" act as an addition to, not as a substitute for, the "guns in direct support," their particular rôle being to break down local resistance at comparatively short range, and for this reason they must be under the command of the infantry brigade or battalion commander concerned. Until, if ever, the infantry possesses a weapon of their own, this close support must be supplied by the artillery. This applies particularly to the case of local defence against tank attack.

"Guns in direct support" on the other hand have been defined as "units affiliated to infantry brigades or battalions, while still

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remaining an integral portion of the divisional artillery." Their chief task is to give support to the brigade or battalion to which they have been attached, but they need not necessarily restrict their fire to its actual front. In the initial phases of the attack these guns will remain directly under the orders of the divisional artillery commander, but on advancing, will come under the orders of the infantry brigade commander to whom they have been allotted. "Guns in direct support" will therefore probably be unable to provide the advanced infantry with any defence against tanks.

The idea of a gun of accompaniment, supplied by the artillery, is by no means new, and close support of infantry has been practised for many years by mountain artillery operating in expeditions on the North West Frontier of India. Independent infantry brigades such as those at Kohat, Bannu and Dera Ismael Khan, each had a battery of mountain artillery permanently allotted to them. Thus the closest co-operation between the infantry and artillery in the brigade was rendered possible and the problems of close support constantly studied in practice. The main object of the allotment of this artillery was to provide a "gun of accompaniment" and this became the most important rôle of mountain artillery. It was considered necessary in undertaking operations against an enemy whose only weapons were the rifle and the sword, to furnish artillery whose function should be close support in the most literal sense of the term.

The type of warfare was, however, a very distinct one, and the efficacy of mountain artillery to fulfil the rôle of close support in a campaign against a well-armed and highly organized enemy was never seriously considered. This was due, mainly, to the obsolete type of weapon with which this branch of the artillery was armed at the outbreak of war in 1914, viz. the 10-pdr. B.L. This, although theoretically adequate for fighting against tribesmen, was certainly quite unsuited to a European war. However, it has been generally accepted by all countries that, as a result of experience gained in the late war, some kind of gun of accompaniment more powerful than the machine gun is required in the future. Although the problems of close support requiring solution in fighting a highly organized foe are somewhat different to those encountered in mountain warfare against an uncivilized enemy, still, as considerable knowledge has been gained as the result of bitter experience in the latter, it is

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beneficial to apply that knowledge wherever possible. The transition from the 2·5″ gun through the 10-pdr. and 2·75″ B.L. guns to the 3·7″ Q.F. howitzer, and the corresponding increased efficiency in close support as found by experience in the late campaign in Waziristan, will probably give some indication of the lines along which future development will take place.

Anti-tank defence.

By this the writer means the task allotted to the guns against tank attack in the organized defence, not the defence of the forward infantry during the assault, as that properly comes under the heading of "close support." At the present time the 18-pdr. Q.F. gun and 3·7″Q.F. how. are the only weapons suitable or available for anti-tank defence, and as the importance of machines in war is likely to increase enormously in the future, this question is intimately bound up with the future development of pack artillery.

Pack artillery at present in existence.

In approaching the question of the organization and equipment of pack artillery for the British Army, it must be remembered that the problem confronting us is somewhat different to and much more complicated than that presented to any other Power. The British Army is required to police various parts of the globe, and it is necessary to enumerate first the different types of warfare in which it may be engaged. These may be classified broadly as follows:—

(a) Warfare against a highly civilized, well-organized and powerful enemy. The country fought over will accordingly be well intersected by roads and other means of communication, and will include a large proportion of arable land.

(b) Warfare against an enemy who is not as well organized or well armed as ourselves, but who is operating in difficult country, which is indifferently supplied with roads, etc., and where climatic and other conditions are unfavourable, as for example, the Balkans, Mesopotamia, or Anatolia.

(c) Warfare against an uncivilized enemy operating in country almost impassable to wheels, such as the North West Frontier of India, or Central Africa.

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The pack artillery at present in existence may be grouped under two main headings :—

1. *The pack artillery at home*, consisting of 4 regular brigades and 1 territorial artillery brigade each composed of 3 batteries of 3·7″ hows.

The transport for these is organized on a partly pack partly draught basis.

The total number of pack animals per battery is	71
,, ,, ,, ,, draught ,, ,, ,, ,, ...	41
Total ...	112
The ammunition carried in the battery per gun is	114
,, ,, ,, ,, ammunition column per gun is	90
Total carried with field units per gun is ...	204

Each battery is so organized that the 2 sections can operate independently with the greatest ease, so that the establishment allows for 6 officers and 41 riding ponies.

2. *The pack artillery in India.* This is organised in brigades each composed of 3 batteries of 3·7″ hows., and 1 battery armed with the 2·75″ B.L. gun. The transport for these is organized on an all pack basis, and consists roughly of 150 animals per battery. The establishment does not allow for the 2 sections to act entirely independently with ease, there being only 4 British officers allowed for the 3 Indian batteries of the brigade, and 5 for the British battery. The ammunition carried in the battery per gun is 96 rounds.

Each brigade has an ammunition column composed as follows :—

1st or Pack Echelon carrying 20 rounds per gun and found from the difference between peace and war establishments.

2nd Echelon with 80 rounds per gun carried on A.T. carts.

In India there is no pack section in the organization of the D.A.C., but if pack artillery brigades are working in the division their ammunition columns will come under the H.Q's of the D.A.C. concerned. The total number of rounds carried in the field per gun is thus 196.

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HOW FAR IS THE EXISTING PACK ARTILLERY SUCCESSFUL IN FULFILLING ITS FUNCTIONS UNDER EACH OF THE THREE CONDITIONS SPECIFIED ABOVE.

A. Against a highly organized well-armed enemy.

1. *As regards the weapon.*

The 3·7″ how. with its wide traverse, steep trajectory and maximum range of 5900 yards is admirably adapted to the close support of infantry as far as the breaking down of local resistance is concerned. Also its rate of fire and shell power is such that it should be a very effective weapon for the neutralization and destruction of machine-guns (12 rounds per gun per minute should be capable of attainment.) The 50% zone at anything except extreme ranges with the various charges is small and probably does not exceed 40 yards, so that the accuracy of the weapon is good, a most important attribute in a gun of accompaniment. However, it is not an ideal anti-tank gun, a state of affairs impossible of achievement by any howitzer. It has been proved that the carriage is capable of standing a fairly large number of rounds fired at a low elevation with 5th charge, although it becomes very unsteady with any considerable amount of traverse. Fitted with the Aldis sight it is possible to attain a rate of fire up to 15 rounds per gun per minute for short periods, so that a section should be able to deal with a section of 4 tanks carrying out a local counter-attack against the forward infantry. It cannot, however, be considered more than a temporary expedient as far as anti-tank work in the organized defence is concerned where an attack in force by tanks is likely to be delivered.

2. *As regards the ammunition.*

At present pack batteries are supplied with H.E. and smoke shell only, in the proportions of 83% and 17% respectively. H.E. with an instantaneous fuze such as the 106 type has proved to be almost, if not quite, the equal of shrapnel in man-killing effect against personnel in the open. It is probably the best possible ammunition for the neutralization and destruction of machine-guns sited in the open or provided only with such light cover as would

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be the case in moving warfare. It is a highly controversial point as to whether H.E. is as well adapted as shrapnel to the close support of infantry in moving warfare, owing to its back effect. There is considerable doubt as to how close it is possible to allow the infantry to approach the immediate objective without lifting, and it is the writer's opinion that it is impossible to take full advantage of the small 50% zone at the normal short fighting range, owing to this back effect. The question of the design of a satisfactory time fuze for shrapnel, and the complication in the ammunition supply have been factors against the introduction of shrapnel up to the present.

H.E. with 106 type fuze is by no means ideal for the penetration of armour, and the introduction of armour piercing shell would further complicate the question of ammunition supply, so that this detracts still more from the merits of the 3·7″ how. as an anti-tank weapon.

3. *As regards mobility.*

The gun of accompaniment should be very mobile, and its normal speed across country should be somewhat greater than that of the infantry it has to support. This essential is possessed in a fair degree only, by the 3·7″ how. The gun and carriage being divisible into 8 loads, the heaviest of which is 240lbs., any one can be transported by hand for short distances should the animal carrying it become a casualty. It can make use of paths, footbridges, gaps in hedges, etc., quite impassable to wheeled artillery, and thus the fact that trotting can only be resorted to for a few hundred yards at a time, is compensated for, in enclosed country at all events, by the almost direct line of advance which can nearly always be adopted.

The target presented in advancing over exposed ground is considerably less than in the case of wheeled artillery, by virtue of the fact that the formation adopted may be a very irregular one, or in case of necessity, the animals can be dribbled up one by one. At the same time it must be admitted that in operations over continuously open country such as the Salisbury Plain area or Picardy, the comparative slowness of movement of pack artillery would render it very vulnerable and it would become impossible for it to accompany

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infantry any closer than artillery armed with the 18-pdr. The equipment being small, with a maximum height above the ground of only 4ft. 4ins., is easily concealed, particularly against observation from the air, there being no wheel tracks if it has been moving in pack.

Finally, owing to modifications to the draught equipment, it can be moved in draught along roads and over any country passable to wheels.

As opposed to these advantages are the facts :—

(i) That the time taken in coming into action from pack is comparatively long. This does not apply when coming into action from draught.

(ii) Ammunition supply in adequate amounts is very difficult to maintain.

(iii) The speed of movement is not sufficiently greater than that of the infantry to allow of its use to the same extent as wheeled artillery in the withdrawal.

(iv) Its short range militates against its employment in rear-guard actions.

4. *As regards organization.*

The organization of the battery into headquarters and 2 sections each with 2 officers and sufficient staff to enable them to operate independently with the greatest ease, appears to be excellent. The number of animals, namely 153, seems high, but is about the minimum possible, and it appears to the writer that 3 ammunition mules carrying 24 rounds per gun in pack are not enough to maintain an adequate ammunition supply, even although it is contemplated that the limbered ammunition wagons will always be close at hand in this form of warfare.

It appears then that the pack artillery at present in existence cannot be said to be fully successful in carrying out all its functions in this type of warfare, particularly if anti-tank defence is considered of primary importance. The question of modifications to the rôles it is designed to fill, and whether they could not equally well be carried out by a combination of 18-pdrs., 4·5″ hows. and tanks, will be considered later.

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B. *Warfare against an enemy inferior in armament but operating in country where roads, etc., are poor and scarce.*

The remarks already made apply in a modified form to this type of warfare, but the question of the provision of more than 3 ammunition mules per gun, is still more acute. The disadvantages of the issue of H.E. alone apply in even greater force in this case. The existing pack artillery at home is, in the writer's opinion, better adapted to this form of warfare than to any other, and this applies particularly if tanks are not likely to be encountered.

C. *Warfare against an uncivilized enemy operating in country almost impassable to wheels.*

The organization of the pack artillery at home is obviously unsuited to warfare of this kind, and that existing in India must be examined.

1. *As regards the weapon and ammunition.*

There are two types of pack artillery weapon provided in India, namely the 2·75″ B.L. gun and 3·7″ how. The 2·75″ B.L. gun has few good points to recommend it. These may be briefly summarized as follows :—

(i) It is lighter than the 3·7″ how., and is split up into 7 loads only, the heaviest of which is 232lbs.

(ii) The ammunition being lighter, 12 rounds can be carried on 1 animal instead of 8. This simplifies ammunition supply.

(iii) The time taken in coming into and out of action is considerably less than in the case of the 3·7″ how. and so it is particularly useful for covering a retirement against a savage foe.

(iv) It is provided with shrapnel shell.

Its main disadvantages are :—

(i) the M.V. of 1200 f.s. is low for a gun, so that the effectiveness of the shrapnel at long ranges is poor.

(ii) The H.E. shell (12½lbs.) is too light to produce much result.

(iii) The traverse of 4° each way is very limited.

(iv) The breech mechanism, being 3 motion, is antiquated in the extreme, and militates against the attainment of the rapid rate of fire so essential to a gun of opportunity.

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(v) The majority of positions occupied must be either semi-covered or in the open owing to difficulties about clearing crests in mountainous country. This is not of paramount importance in fighting against an enemy armed with the rifle alone, but might lead to disastrous results against one armed with machine-guns, or a pack howitzer.

(vi) In fighting in thick bush the difficulty of finding any position from whence the trajectory would clear the trees at short ranges

The limitations of the 3·7″ how. in mountainous country owing to being provided with H.E. only and having a steep angle of descent, are :—

(a) The difficulty experienced in effectively engaging enemy occupying a knife edge.

(b) Difficulty in observing fire in a country abounding with hills and deep valleys.

(c) The backward effect of H.E. (particularly in very rocky country) and the consequent inability to exploit to its utmost the far greater accuracy of the 3·7″ how.

The idea that howitzer fire is at a disadvantage as compared to gun fire in mountainous country owing to the greater liability of hitting our own infantry, was proved to be fictitious in a recent quarterly summary, so that as far as the weapon is concerned the 3·7″ how. is much superior to the 2·75″ B.L. gun, is well adapted to fighting in either mountains or thick bush, and is only handicapped in so far as it is not at present supplied with shrapnel.

2. *As regards mobility.*

The 2·75″ B.L. gun is very mobile, and can come into, or out of, action in under 1 minute for the reasons that :—

(a) The gun is split up into 7 loads only.

(b) The equipment is comparatively light.

Unfortunately this mobility is almost neutralized by the fact that, owing to the ever present question of crest clearance at short ranges, positions in valleys are often very difficult to find and much climbing has to be carried out. In the case of the 3·7″ how., which is less mobile than the gun, the same remarks apply as in the case

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of warfare against a highly organized enemy, but the ease with which positions can be found in mountainous country or bush, is still further accentuated.

3. *As regards organization.*

It must be remembered that in this form of warfare pack artillery may be the only type which can operate at all, once the enemy's territory has been thoroughly penetrated. Four batteries per brigade thus appears to be the best organization, but it is doubtful if the equipment of one of them with a weapon like the 2·75″ B.L. gun is sound. It would seem that, until a really efficient Q.F. gun is designed, all 4 batteries should be armed with the 3·7″ how. Apart from questions of the efficiency of the gun, complications regarding ammunition supply and spares, etc., are bound to arise.

The Indian establishment fails in that only 4 British officers per Indian battery and 5 per British are allowed. In the case of the former there are perhaps a sufficiency of Indian officers to allow the 2 sections to operate entirely independently, but in the latter case there certainly are not. Quite apart from that however, a sufficiency of signallers, range takers, etc., to supply the requisite staff for each section, and yet leave the battery commander with adequate means of communication, etc., are not allowed. This is a very grave fault, and has caused unnecessary difficulties time and again, staffs having to be invariably extemporized, but it is presumably the result of financial stringency.

THE POLICY OF FOREIGN NATIONS WITH REGARD TO PACK ARTILLERY.

Having briefly reviewed the special tasks which pack artillery is called upon to carry out, and the ability of that at present in existence to do so, it is possible to consider probable modifications in the nature of those tasks, and the consequent future development of the arm. Before doing so it is worth while to outline the policy of foreign nations.

1. *France.*

That country appears to have a tendency to differentiate entirely between :—

(a) *Mountain artillery*, i.e., artillery designed solely for operations in country more or less impassable to wheeled artillery, and

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(b) *Artillery of accompaniment.*

The sharp dividing line drawn between the two, may be gauged by the following quotations from a recent article by a French artillery officer.

"The accompaniment of infantry under fire (by mountain artillery in the late war) always remained fruitless and cost terrible losses."

"The reports of participants as to the lessons to be drawn from the war, unanimously condemn the duty of acting as accompanying batteries, and the abuse of the practice of sub-division (into sections)."

The policy of the French as far as the equipment of the mountain artillery is concerned, is very similar to our own as regards the pack artillery considered generally. For instance, the limit laid down as the maximum total load to be carried by a mule, is about 380lbs., giving a maximum for any top load of 240lbs. The latter exactly corresponds to that of the 3·7″ how. The 65$^{m/m}$ and 75$^{m/m}$ guns have been the only modern pack artillery weapons, the resulting complication in the ammunition supply, and few number of rounds per gun they consider could be carried in the field owing to the weight of the projectile, having apparently deterred the French from seriously contemplating the introduction of a howitzer. They have however, considered the provision of reduced charges for the gun.

The authority previously quoted summarises the requirements of mountain artillery as far as the weapon is concerned by stating that it must satisfy the following conditions:—

(a) *Manœuvring qualities*, i.e. lightness, rapidity in coming into action and limbering up, and a wide arc of fire.

(b) *Ballistic qualities.* Precision, long maximum range, efficiency, steep angle of descent, and hence great searching power.

He states that such conditions cannot be secured in a single gun without having to resort to an unsatisfactory compromise. The solution in his opinion is the introduction of a pack howitzer incorporated in the mountain artillery brigades, which should in future consist of 1 battery of howitzers and 2 of guns. He makes a most important statement, to the effect that the how., as distinct

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from the gun, would be able to play as important a rôle on the plains as in the mountains. This fully confirms our own theories on the subject.

The weapons he suggests are :—

	Gun	Howitzer
Bore	75m/m Q.F.	95 to 105m/m Q.F.
Ammunition	Fixed	Separate
No. of charges	1	4
Weight of projectile ...	About 14lbs.	About 30lbs.
Types of shell	Shrapnel 30% H.E. 70%	H.E. only
Maximum range	9000 yds.	6000 yds.
Total weight	1100 lbs.	1550 lbs.
Number of loads per gun	5 at the most	7 at the most

As far as the "gun of accompaniment" is concerned the French view appears to lean towards some form of light automatic gun manned by the artillery, but more or less permanently allotted to infantry brigades the moment the division becomes engaged. They have been experimenting with a 37m/m gun which can be transported either on its own wheels limbered to a small 2 wheeled limber drawn by 1 horse, or in 3 loads. The total weight is 237lbs, and the maximum range is 2600 yards. The M.V. is comparatively high, varying between 1148 f.s. and 1312 f.s., but the projectile weighing about 1lb. has a very weak bursting charge, and would appear to be of little use against personnel. Its maximum rate of fire is between 15 and 20 rounds per minute, it can be fired off its own wheels or a tripod, and presumably its main function is anti-tank defence.

2. *Belgium.*

That country is at present experimenting with a 3″ mortar carried in 2 parts in a wheeled 2-horse cart along with 100 rounds of ammunition. It cannot be manhandled for any distance across country but is designed to travel on a pair of small wheels for the limited distance contemplated as ever likely to be necessary. It has a maximum range of about 1000 yards.

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3. *Italy.*

The policy of the Italians with regard to pack artillery is more nearly similar to our own than that of any other nation, that is to say, they have not designed a special infantry gun but consider that the mountain artillery is perfectly capable of carrying out all the duties of "close support."

They have more or less adopted 2 weapons, namely the 75$^{m/m}$ Skoda mountain gun, and 10$^{c/m}$ Skoda mountain howitzer. The 75$^{m/m}$ gun is divisible into 7 loads, the heaviest being 250lbs., which is slightly greater than that of the 3·7″ how. All 7 loads are almost identical in weight, so that it would appear that the equipment is heavier than the 2·75″ B.L. gun. The weight of the shell is 14lbs. 5ozs., and the maximum range about 7500 yards.

The 10$^{c/m}$ how. is designed to travel in three vehicles and its weight in action is 2720lbs., which is very much greater than the British equivalent, the 3·7″ how. The weight of the shell is 35lbs. and the muzzle velocity 1100 f.s.

4. *Japan.*

Trials have been taking place with a 37$^{m/m}$ infantry gun the total weight of which is 290lbs. This is divisible into 5 loads, so that there should be no difficulty in manhandling the equipment. The transport allowed is 2 light horse-drawn carts per gun, one to carry the gun, and the other the ammunition. The establishment contemplated is 4 per infantry regiment and its primary duty is the destruction of machine-guns for which purpose fixed ammunition with H.E. is provided. A secondary duty is anti-tank defence and for that purpose armour piercing shell is provided. Its maximum range is about 5500 yards.

5. *U.S.A.*

Here also the attempt is being made to design a gun which weighs less than 300lbs., and the conclusion has been reached that a howitzer, as well as a special anti-tank gun with high m.v. is required.

6. *Germany.*

As far as the "infantry gun" is concerned the 77$^{m/m}$ mountain gun has been adopted, but so far the establishment allows for a very small proportion per division.

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THE EVOLUTION IN TACTICS AND ITS INFLUENCE ON THE METHOD OF EMPLOYMENT OF PACK ARTILLERY.

The evolution in tactics necessitated by changes in armaments, means of transport and communication, etc., will vitally influence the rôle of pack artillery in future wars, and may indeed cause a considerable departure from our present conceptions. The amount of this departure will vary according to the type of warfare in question, and will depend upon the organization, armament, etc., of the enemy. There is one great invention, the development and perfection of which is likely to influence profoundly the question of the employment of pack artillery in whatever theatre of war it is engaged, and against whatever type of foe, and it is for that reason that the writer has placed it in a separate category. The invention in question is radio telephony. Even the now obsolete instruments tried some time ago were quite successful over a range of about 6000 yards and could be carried in half a limbered G.S. wagon. The instrument of the future will probably weigh under 40lbs., be carried by one man, and have a radius of action of many miles.

This will modify the whole problem of communications from the O.P to the battery, and profoundly affect the entire question of "close support." The "artillery in close support," with the exception of the anti-tank guns, will no longer be compelled to closely accompany the infantry, but will simply require to detach the requisite number of F.O.O's, each with perhaps 2 signallers and an assistant, to accompany the headquarters of the different infantry formations to which its units have been allotted. Thus any nature of artillery could conceivably be called upon to furnish close support to the infantry and the whole question immediately assumes a much broader aspect.

This line of argument seems to indicate the elimination of pack artillery altogether in the future, as apparently a combination of 18-pdrs., 4·5 hows. and tanks can carry out any duty as well, if not better, but the following in the writer's opinion, are cogent reasons for its retention.

1. Anti-tank defence for the forward infantry until, if ever, a gun is designed to be manned by the infantry themselves or some other successful measure is adopted.

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2. The provision of very mobile artillery able to go anywhere, and push forward with the maximum of speed, and accompany the infantry, if necessary, after a successful assault.

3. A weapon capable of movement off roads in very mountainous country or in thick bush.

4. An equipment suitable for transport over long distances by aeroplane if necessary, and therefore particularly well adapted for participation in minor operations in such countries as Mesopotamia, the Sudan, etc.

Now let us consider the probable employment of pack artillery in the future in the different types of warfare already enumerated.

A. *In a campaign against a powerful and well-armed foe.*

It has become more or less of a platitude to say that armies will be more and more mechanicalized as time passes and science progresses. It is probable that tanks will increase in importance and numbers as they are perfected, and will eventually form the backbone of the attack, the infantry consolidating and holding with their rifles and bayonets the positions overrun. This does not mean that the infantry soldier will not still remain the decisive factor in war, but that both his task and that of the artillery supporting him will undergo some modifications.

The future development in the process of waging war will, in the writer's opinion, be divided into 2 stages :—

(i) *The transition stage* from the present organization of armies to a more or less completely mechanicalized basis. During this stage, which is likely to extend over many years, the tank, or some development of the tank, will gradually grow in importance, but will form merely an adjunct to the infantry, which will still be compelled to march and fight on foot. An ever increasing percentage of the artillery will meanwhile be provided with mechanical traction. As the number of tanks provided in the war establishment of armies increases, their speed and armour are improved, and the silencing of their engines perfected, the absolute necessity for the provision of a real anti-tank gun will become more and more urgent This will probably take the form of the 3″ 20 cwt. A.A. gun, be semi automatic, have a very high m.v. in the neighbourhood of 2500 f.s. and be mounted on some form of fast moving tractor off

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which it could fire. It might be possible to design an equipment which would be able to carry out the dual rôles of anti-aircraft and anti-tank defence.

The provision of a weapon of this nature would absolve the artillery commander from the necessity of definitely allotting a proportion at least, of the pack artillery under his command to anti-tank work in the defence. This would mean that all the pack artillery was available to take its share in the normal work of the divisional artillery instead of a portion having to remain silent until the delivery of a highly problematical tank attack. Also design would be simplified as the problem of incorporating in one equipment, a howitzer with a low m.v. firing a projectile intended primarily for the destruction of machine-guns and personnel, and a high velocity gun whose chief characteristic was a rapid rate of fire and whose sole function lay in the destruction of tanks, seems well nigh insuperable. During this period then the rôle of pack artillery will, with some modification, remain more or less what it is at the present moment, viz. :—

(a) Close support of the infantry.
(b) The normal work of the divisional artillery.
(c) Anti-tank defence as far as the forward infantry alone are concerned.

The 3·7″ how., with some slight modifications, should be capable of the limited amount of anti-tank defence implied in the protection of the forward infantry during the assault, but the anti-tank guns will have to move forward as quickly as possible once the objective has been gained to cover it against a counter-attack in force. However, the writer is convinced that the only satisfactory solution to the problem of "close support" will ultimately be found by definitely abandoning the idea of employing the 3·7″ how. as an anti-tank weapon and in exploiting and substituting other measures for anti-tank defence. Thus rôle (c) above will be gradually eliminated.

(ii) *The stage of more or less complete mechanicalization of armies.*

The assault will be carried out by tanks supported by infantry, whose chief task will be to consolidate and hold the position over-

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run, that is to say the former will overwhelm the fire of the defence, after which the latter will clean up the objective with rifle and bayonet. This pre-supposes the necessity of infantry following very closely in the wake of the tanks, in order to obtain the maximum amount of protection whilst advancing, and to be able to overwhelm the enemy with the bayonet before he has time to recover. The tanks forming the backbone of the assault will be capable of movement across country at from 15 to 20 miles per hour, and this will necessitate some kind of mechanical carrier for the supporting infantry capable of a corresponding speed. The advance will accordingly be very rapid, and as guns on the move are unable to take any part in the combat, the artillery in "close support" will not accompany the infantry.

Indeed this will not be necessary even in the very near future, as has been pointed out, owing to the introduction of radio telephony, and the necessity of providing guns for the anti-tank defence of the forward infantry will alone be responsible for "artillery of accompaniment." Artillery will probably never move in bounds of less than 5000 yards in order to make the most of its gift of long range and therefore that gift will have to be developed to the fullest extent. This applies with as much force in the case of pack artillery as of any other branch. It follows then, that as guns engaged in destroying tanks must be able to lay direct in order to obtain the maximum effect from their fire, the artillery in close support cannot be expected to protect the forward infantry against tank assault.

This duty of protection will be carried out partly by the tanks carrying out the assault, but infantry will have to be provided with a weapon capable of stopping tanks in case of counter-attack. This weapon being designed solely for anti-tank defence, would only require to fire direct at comparatively short ranges, and so would entail no great technical artillery knowledge, and could take the form of a light Q.F. gun firing off a tripod and manned by the infantry themselves. Its transport would not present the difficulties it does at present, as it would accompany the infantry detachment in a carrier. Thus the rôle of pack artillery under these conditions would be much simplified, and become in order of importance :—

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(a) Close support of infantry.

(b) Any of the normal tasks allotted to the light guns of the divisional artillery.

B. *In the case of a campaign against an indifferently armed enemy.*

Though the corresponding development will not be nearly so far reaching, or take place so rapidly, as that enumerated above, it is an error on the safe side to base one's calculations on the following suppositions.

(a) Any civilized nation we are likely to fight will possess tanks, aeroplanes and a proportion at least of mechanical transport for guns, etc.

(b) Uncivilized tribes, such as those inhabiting the N.W. Frontier of India, will be armed with machine-guns at least.

Hence the tasks on which pack artillery will be employed in this class of warfare will remain identical with those already enumerated.

CONCLUSION.

ALONG WHAT LINES MUST THE DEVELOPMENT OF PACK ARTILLERY PROCEED IN THE FUTURE, IN ORDER TO KEEP ABREAST OF THE EVOLUTION IN TACTICS, ETC.

Before coming to any conclusions on this rather difficult and complicated subject, it is necessary to emphasize again the oft reiterated statement that the British army may be called upon, at very short notice, to fight under many diverse conditions. It is thus dangerous to attempt to apply too closely the various conclusions reached by foreign nations. The organization of the British army should be elastic and as adaptable as possible to the different conditions implied, and the equipment standardised to the fullest possible extent.

This applies to pack artillery particularly, and in order to accelerate the transformation of a unit prepared for one class of warfare into one fully equipped for another, and simplify manufacture, supply, and expansion in time of war the following conditions should be observed as far as is compatible with efficiency :—

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1. The provision of as few different natures of weapon as practicable. The ideal would be one only.

2. The weapon should be light, and capable of transportation equally well in pack or draught.

3. The ammunition should include a proportion of both H.E. and shrapnel, and must not be too heavy for transportation in adequate amounts on pack animals.

4. The organization within the brigade and battery should be as nearly similar as possible at home and abroad, or at least capable of rapid transformation from a savage to a civilized warfare basis. Bearing in mind the paramount importance of rendering possible the employment of pack artillery in any theatre of war, the lines along which development will take place are, in the writer's opinion, as follows :—

The weapon.

A howitzer with a maximum range of about 8000 yards and an arc of fire of at least 90° will have to be designed. The calibre will be somewhat greater than that of the 3·7″ how., but the weight of the piece will remain approximately the same owing to improvements in the manufacture of steel and the adoption of the principle of "Auto-Frettage."

The Ammunition.

The weight of the projectile will have to be slightly increased from 20lbs. to about 25lbs., and shrapnel, H.E., smoke and gas-filled shell provided. The inaccuracies at present encountered with shrapnel, due to the provision of an ignition type of fuze, will be entirely obviated by the perfection and adoption of a mechanical type.

Transport.

It is in the method of transport that the greatest revolution will take place, and the most marked difference appears between the pack artillery at home and abroad.

For the artillery equipped for civilized warfare mechanicalization of the means of transport appears to be absolutely necessary in view of the evolution in tactics already outlined. Further reasons for its adoption are :—

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1. The necessary speed of movement to conform with that of the remainder of the divisional artillery.

2. The comparative ease of concealment of a few light motor vehicles.

3. The carriage of the necessary amount of ammunition.

This mechanicalization might take the form of:—

(a) A tractor behind which the gun would be pulled. The objection to this solution is the impossibility of designing a light and low equipment capable of travelling across country on its own wheels at 15 to 20 miles per hour.

(b) Some type of small tank on which the gun would be mounted and from which it would fire. The advantages of a vehicle of this type would be the facts, that the gun could be provided with an all-round traverse, require the minimum amount of time to come into action, and if necessary be able to fire direct while on the move. On the other hand its disadvantages are many, the most obvious being the facts that an accident to the vehicle rendering it unserviceable would put the gun out of action, manufacture would be slow and costly, and the equipment by its very nature would be incapable of adaptation to different classes of warfare.

(c) A mechanical vehicle which would carry the gun prepared for action. The gun would be run off the vehicle, and manhandled the necessary short distance on to the actual position, on its own wheels. This type of transport conforms to most of the essential requirements, namely rapidity of movement, speed of coming into action, and ease of concealment, without requiring a radical departure in the design of the weapon rendering it unfit to travel in pack if necessary. These vehicles would be light, have a small maximum height above ground, and a narrow wheel track. As many of the detachment as possible, along with a proportion of the ammunition, would be carried on the same vehicle as the gun. A second vehicle, identical with the first, would convey the remainder of the detachment and ammunition, and in the event of a casualty could be utilized for replacing the latter. Light motor cars with some type of tractor wheels would be provided for the battery commander, captain, section commanders, and their respective staffs.

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The transport for artillery equipped for semi-civilized or savage warfare would remain much as it is at present at home and abroad respectively.

Organization.

Pack artillery will certainly form a proportion of the divisional artillery and will probably be allotted at the present scale, namely 1 brigade per division, though this is a point on which it is difficult to form any definite conclusion. As the rôle of gun of accompaniment will no longer be required of it in civilized warfare, there is no reason why the pack artillery brigade should not consist of 4 batteries and that is the organization which will probably be adopted.

The present establishment of officers per battery should be maintained, but a considerable economy in other ranks could be effected by the elimination of all drivers except those required for the vehicles and a percentage spare. There would be a reduction in the strength of the various staffs due to the abolition of horseholders, and the total resulting decrease in establishment should be about 70. The number of mechanical vehicles required per gun, including those for ammunition, should not exceed 2, which with 1 spare would make a total of 9 per battery. Besides these, 4 light motor cars would be required for the battery commander, captain, 2 section commanders, and their staffs respectively.

The British establishment for batteries abroad organized on a semi-civilized warfare basis would be numerically much the same as the above, the substitution of the requisite number of Indian drivers, animals, saddlery, and harness for the mechanical vehicles being necessary to effect the transformation from a civilized warfare establishment. The problem of providing British ranks capable of riding sufficiently well to form the staffs, is one which may well prove extremely difficult to solve.

In the above brief summary the writer has not attempted to formulate any detailed views with regard to the pack artillery of the future, but merely to indicate his conception of the broad lines along which progress is most likely to take place. The march of science may render any or all of these conceptions entirely worthless.

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THE EMPLOYMENT OF MECHANICAL TRANSPORT BY TERRITORIAL MEDIUM ARTILLERY.

By Lt.-Col. (Bt.-Col.) Edward V. Hemelryk, D.S.O., T.D.

THE extremely interesting article in the July number of this Journal by Lieut. Burlton, R.A., on the subject of horsing Artillery Brigades, has encouraged me to send the following short summary of the post-war experiences of my own brigade, the 59th (4th West Lancs.) Medium Brigade, R.A. I do so in the hope that some scheme of mechanical transport for the Territorial Artillery may be devised, which will increase its mobility and efficiency. In his article, Lieut. Burlton has mentioned practically all the difficulties with which the Territorial gunner has to contend in the question of untrained horses. In support of his arguments, I should like to state how frequently I have witnessed, before the War, scenes of the following kind:—

A brigade of artillery arrives at Amesbury or Trawsfynydd, complete with personnel, guns and harness. After a short delay, a trainload of horses, which none of the officers or men have seen before, comes in. The horses are detrained, immediately allotted to batteries, and the unfortunate battery commander proceeds, to the best of his ability, to sort them into teams. After harnessing, the batteries march to camp: scenes of indescribable confusion take place, resulting in kicks, galls—and, what is more serious—accidents to the men. (I myself know of one case, in 1907, in which eleven men, from one battery alone, went to hospital on the first day.) This sort of thing is a severe task even for the experienced and fully-trained regular driver, and it is one which no partially trained driver should be asked to undertake. Furthermore, it frequently happens that, on arrival in camp, the Board casts a number of horses, and the two or three days' delay waiting for these to be replaced, causes a loss of time for training, when every minute is of value. Thus, even should a number of trained drivers be available, a battery can only settle down to proper driving drill and

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practising manœuvre on about Wednesday of the first week, instead of, as should be the case, on the very first morning of camp. I would therefore endorse Lieut. Burlton's suggestion, that horses should be bought by the authorities, and made to do a number of consecutive camps, to avoid a recurrence of these pre-war scenes, when the present supply of war-trained drivers becomes exhausted.

Bearing all the foregoing in mind, and with the experience of pre-war camps, the 59th (4th West Lancs.) Brigade set itself the task of trying to solve the difficulties. There were, in pre-war days, large numbers of men, coachmen, grooms, drivers of tradesmen's vans, who, in civilian life, looked after horses: and, since the War, there are many ex-service men, who served as artillery drivers; but both these categories are slowly disappearing: the former practically no longer exists in large towns. In a few years, when the present supply of officers and men with war experience begins to be exhausted, horsemastership will slowly disappear; you may teach a man to ride, and even to drive well, but, in a fortnight a year, he cannot acquire the art of horsemastership, which is so absolutely essential to the real efficiency of a mounted unit. The only solution, therefore, of this problem lies, to my mind, in the adaptation of civilian efficiency to army methods. In the thousands of lorry motor drivers all over the country, who are not only competent drivers, but also skilled mechanics, we have the necessary personnel for the required mobility of territorial batteries, and it now merely rests to find, in civilian life, the machine capable of doing the work.

The following motor-driven vehicles only are available:—

1. DRAGONS. These are, at present, in the trial stage in the regular army: they are not used, nor do they exist, outside it. Moreover, their cost is prohibitive.
2. MOTOR LORRIES. The ordinary civilian lorry requires good roads, though it has done good service on Salisbury Plain.
3. F.W.D's. These more or less disappeared after the war, and are practically unobtainable, though latterly they have been used to a certain extent for road-making, and can now be obtained for training. The F.W.D., however, has not proved very satisfactory for medium artillery except on really good, dry ground.

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4. CATERPILLARS. It is, I think, generally recognised that, during the war, these were found to be clumsy and unsatisfactory, owing to the frequency with which the tracks were worn out. The cost is prohibitive, and none are to be found in civilian life.

There remained, therefore, only the Fordson farm tractor, and with this machine after several minor adjustments had been made, the brigade proceeded to carry out trials. The Fordson tractor has several advantages :—

1. There are a large number in the country, and, though I have no definite statistics, I think I am fairly safe in saying that about three thousand would be available on mobilization.
2. Being used mainly for ploughing, it is accustomed to go over rough ground, and is specially designed to run at a low speed—a distinct advantage when moving with infantry. Its best running speed is about three miles an hour, although, on an ordinary road, the machine, with a 6″ how. attached, is capable of doing eight miles an hour—a pace which it would certainly attain, even over rough ground, with an 18 pdr.
3. Owing to its small size, the Fordson occupies very little road space. With each gun, three horse-lengths are saved—a very considerable item when on the march. Moreover, when moving by rail, two tractors fit on to one truck.
4. The cost, even with the necessary adaptations, is low: certainly much cheaper than a team of eight horses, and only a fraction of the cost of a dragon. If more than one brigade could be found to use them in camp, the expense of hiring tractors would probably be considerably lower than that of hiring horses.
5. As regards personnel, no difficulty was found in training the men; and, although a number of drivers preferred the horses, they soon settled down, and became extraordinarily keen.

In 1923 two of the batteries went to camp horsed—the other two batteries used Fordsons, and the principal lesson learned was

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that the two tractor batteries advanced more rapidly in training and efficiency during the fortnight's training. This, I think, was due to the fact that the officers of the tractor-drawn batteries were able to use the time, generally devoted to looking after horses, in training their N.C.O's and men in signalling, gunnery, specialist work and the training of battery staffs. Several adaptations, however, had to be carried out on the tractor, in order to reap the benefit of the foregoing advantages. On the road the tractor runs with solid rubber tyres, and even with the 60 pr., will tackle quite steep gradients. During the trials it was found that, owing to the lightness of the machine, it did not always grip the road, but this difficulty was overcome by using disc wheels filled with shot, which increased the weight and gave a better gripping power. On soft ground, it was found that the rubber wheels were not sufficient. Tyres were then made of a type similar to the wheel used by Fordsons for ploughing. These were cut into two sections, and joints attached. A frame was fixed, above each wheel, on which were carried the two half-sections, thus forming a kind of mudguard. A lever was carried by the driver's seat, which enabled the gun detachment to lever and clamp the two sections over the rubber tyres, preparatory to coming into action, or going over rough ground. This, although it sounds rather complicated, only occupies a few minutes, and with a well-trained detachment, the time could be still further reduced. The ground, however, has to be pretty bad before the need for this tyre arises. On Salisbury Plain it was found that the rubber tyres, except in very wet weather, would take the 6″ howitzer over most places.

Although the foregoing points illustrate the advantages of the tractor, several disadvantages were discovered:—

Low clearance. The body of the machine is too near the ground, and consequently, on soft ground, sticks, if the wheels dig themselves in too deeply. This might, however, be obviated by the use of a more powerful engine, thus enabling a larger wheel to be carried, and raising the machine more off the ground. Furthermore, the tractor is so small and so easy to manœuvre, that the difficulty of clearing boulders in rough ground can very often be got over by jinking.

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Pace. The pace of the Fordson is very much slower than that of the F.W.D's. or the Dragon, and, moreover, it carries no personnel. But, as even when horsed the pace of the battery is determined by the pace of the dismounted gun detachments, this does not appear to be a very serious fault.

Rearing. The Fordson showed a tendency to rear, running a risk of throwing the driver over backwards, when the gun stuck. This was overcome by the attachment of a weighted pendulum, a few inches in length, which acted as an anti-rearing device, so that, when the tractor reared above 35° the current was broken automatically, causing the immediate stoppage of the engine, and so preventing the machine rearing above 35°.

Sand and very soft loose earth. This the tractor, with a heavy gun, was unable to tackle, as the wheels dug themselves in, and did not grip. It is, however, doubtful, whether untrained horses would tackle the problem any better. The contractors from whom the Fordsons were hired, maintain that, given sufficient funds from military sources for carrying out necessary trials, they would be able to produce a wheel for the tractor capable of drawing eight tons through sand. On the whole, therefore, the advantages of the Fordson tractor would appear to outweigh its disadvantages, and, although naturally one cannot claim that the ideal machine has been found (as funds are not available for a T.A. Brigade to carry out experiments, nor do the proper facilities or personnel exist)—still, with the limited means at its disposal, the brigade which I had the honour to command endeavoured to find a cheap solution of the mechanicalization of territorial medium brigades. Practical experience had proved, in one camp alone, that tractor-drawn batteries advance far more in efficiency than horsed ones, and, although well aware that it is far from perfect, I am of opinion that we have, in the Fordson tractor, a cheap and a fairly efficient substitute for the average contractor's untrained horse team, and one which certainly does away with what Lieut. Burlton very rightly calls "Whole days of ceaseless struggle between half-trained man and untrained beast."

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THE IMPERIAL NERVES AND ARTERIES.

By Lieut. G. L. Appleton, R.A.

THE growth of the Empire is very closely linked with the development of its communications. To-day, no less than formerly, the safety and prosperity of our far flung dominions is dependent on the certainty and ease with which touch can be maintained between the Dominions and the mother country. Our transportation and signal routes may be likened to the arteries and nerves of the body. In just the way that the perfect functioning of the blood and nervous systems is essential to a healthy body, so does the swift and efficient operation of our communications materially contribute to the well-being of not only each individual state but of the Empire as a whole. The student of Imperial organization, a subject of increasing military importance, will find that a knowledge of the framework of the communications of the Empire will form a useful basis from which his studies can develop. This article is written with the object of providing a broad survey of the subject, with special reference to points of strategic interest and importance.

In one form or another, Imperial communications may be found on the agenda of successive Imperial Conferences since 1887, when the first Colonial Conference, as it was then called, was held. The subject again came into special prominence at the Imperial Economic Conference in October and November of last year, when forceful speeches were made by Dominion premiers, notably by Mr. Bruce of Australia, on the necessity of improved cable and wireless facilities. It is noteworthy that the Dominions have always been in the forefront in demanding adequate communications with the mother country. They realise their value. If adequate communications are not provided by the mother country those vital links will be forged elsewhere, with the result that the sympathies and thoughts of the Dominion peoples will be alienated, and Dominion trade, which should flow towards Great Britain as the natural Imperial exchange and mart, will be diverted to countries

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outside the Empire. Communications, in the general sense of the word, may be divided into two groups. First what may be called the arterial system: the carriage of personnel, freight and mails, and secondly, the nervous system: the signal organization of cables and wireless.

The Arterial System of the Empire.

The four main agencies contributing to the arterial system are sea, rail, road and air transport. Since the earliest days of the Empire the integrity of our sea communications has been the main essential of our existence. All other modes of transport are but adjuncts to our main arteries, the sea routes. The network of our sea and rail communications may be divided into four main groups, (a) the northern, including the North Atlantic Ocean and the Canadian railways, (b) the Pacific, (c) the southern, including the South Atlantic and the African railways, and (d) finally what is perhaps the most important of them all, the eastern group, communicating through the Mediterranean with India, Australasia and the Far East.

The Northern Route.

The North Atlantic route, while carrying a higher density of shipping of all nationalities than any other, is also one of our safest from a strategic point of view. No foreign ports lie in close proximity to it, and it nowhere passes through any marked defile. The Canadian terminals possess a special interest in that sea transport can penetrate to the heart of the country by means of the matchless water communications provided by the River St. Lawrence and the Great Lakes. At the moment vessels communicating with the interior are limited to a draught of 14 feet. An international commission composed of Canadian and American representatives sat in 1921 to consider the improvement of the waterway, and recommended a scheme by which ocean going ships could enter the Great Lakes, and a further four millions hydraulic horse-power be made available. Two obstacles have arisen, however: first, the great cost involved, which will be between fifty and a hundred millions sterling, and secondly, the political opposition of the eastern provinces, who see in the scheme an undue Americanization of this great waterway. It is probable that a large portion of the

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necessary funds will have to be furnished by the United States, who will doubtless desire a commensurate control of the River St. Lawrence. The southern bank of the river is largely in United States territory, the river therefore must be regarded as being strategically weak as an Imperial line of communication. With a view of lessening this disability as well as of shortening the route to Lake Superior a canal has been projected to connect Lake Huron with the Ottawa River by way of Georgian Bay and Lake Nipissing.

At the close of the Anglo-American war in 1812 the States and Great Britain agreed that no armed shipping should be maintained by either country on the Great Lakes. The existence of this half-forgotten treaty was brought to mind in a curious manner in 1923 when the States placed armed motor-craft on the lakes to deal with alcohol smugglers and thus technically violated the treaty.

An important "back-door" to Western Canada exists in the Hudson Bay route. Port Nelson, on the south coast of Hudson Bay, will be the terminal of a branch railway connecting with the main system in Saskatchewan. The use of this port will not only shorten the journey from Western Canada to England, but will also afford an additional and cheaper route for the export of the produce of the prairie lands. Another route of a similar nature has been planned to connect Moose Factory, on the southern shores of the Bay, with the Quebec-Winnipeg trunk line. The advent of winter renders the navigation of the St. Lawrence and Hudson Bay impossible. Canada then has to depend on her ice-free ports on the Atlantic coast and on her railways. The three important ocean harbours are Halifax, St. John and Sydney, all connected by rail with the continental system. At the time when the prohibition controversy was at its height it was suggested that British steamship lines could make one of the Canadian harbours their terminal for the United States instead of New York, thus avoiding the American prohibition regulations. Apart from the question of prohibition the journey from England to New York would be shortened both as regards sea-passage and in time if ships called at Halifax, from whence the journey could be completed by fast express train. The expense of transferring dock facilities from New York to Halifax is, however, a sufficient reason to deter the shipping companies from doing this.

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The pioneer trans-continental railway in Canada is the Canadian Pacific. The reasons for its construction were strategic and political as much as commercial. British Columbia made its construction a condition of her entry into the Dominion in 1871. Before railway communication with this province was established Western Canada was virtually cut off from the eastern provinces. British Columbia, a part of the Pacific slope, was not unnaturally forming a community of interest with the American Pacific States rather than with the Canadian eastern provinces. The construction of the Canadian Pacific Railway was an invaluable factor in knitting together east and west in the early days of the Dominion, besides establishing a link in an Imperial route to the Far East. To-day three trans-continental systems connect Halifax and St. John on the Atlantic with Vancouver and Prince Rupert on the Pacific. The systems all converge at Winnipeg at a distance of about a hundred miles from the United States frontier. Strategically this constitutes a serious weakness in Canadian communications. It is an unavoidable defect until the development of Northern Ontario and Manitoba leads to railway construction round the north of Lake Winnipeg.

The tendency of railway development in the future will probably be in the direction of the north west. Reports have recently been received of a vast oil bearing region in the Mackenzie basin. If these reports are borne out the Empire will in time have the inestimable advantage of a great new oil-source in purely Imperial territory.

Our second Imperial route in the North Atlantic bears our trade to the Pacific by way of the West Indies and the Panama Canal. Of recent years West Indian trade has somewhat languished, one factor being the competition of the sugar beet industry which re-acted unfavourably on the cane sugar market. An entirely new situation developed in 1920, when occurred one of the most important events in American history—the opening of the Panama Canal. At a stroke the ancient trade route round Cape Horn was diverted through the Carribbean Sea. Our West Indian possessions have resumed something of their one-time strategic importance which they possessed when the Spanish Main was the focus of the trade and wealth of South America. The British West Indian islands

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lie on the American trade routes through the canal. On the other hand our trade route from Great Britain, although flanked by United States ports, is protected by a flank guard, the naval station of Bermuda. The effect of the construction of the Panama Canal on American trade has been immense. The journey to the west coast, and also especially to the Far East and Australia, has been shortened by several thousand miles, thus conferring an important advantage on the manufacturers of the east coast of the United States. Further it has enabled the United States to combine her Pacific and Atlantic fleets and thus concentrate her naval strength on either coast with comparative ease. San Francisco is now more than ever the gateway of the Pacific, as it lies within a short distance of the shortest route from Panama to the Far East. Honolulu, always an important advanced naval base, and occupying as it does a central position in the Pacific, has also gained by becoming a port of call on the new trade routes through the canal.

The Pacific Group.

The main routes in use by British shipping in the Pacific are five in number. Two have the important Canadian railway termini of Vancouver and Prince Rupert as starting points. One of these runs roughly parallel to the San Francisco—Far East route, following a great circle south of the Aleutian Islands to Japan and Hong Kong. With adequate rail and steamer services this route will afford the quickest means of reaching Japan from Europe. The other runs by way of Honolulu and Fiji to Australia and New Zealand. This latter route has an element of weakness in that the American naval station of Honolulu dominates the shipping tracks in the central Pacific. The third and fourth routes enter the Pacific by way of the Panama Canal. The third, running southwards, has its commercial value to Great Britain in that it shortens the voyage to the west coast of America. The fourth, to Australasia, provides an alternative to the Mediterranean route but does not, except in the case of New Zealand, shorten the passage from England to the Antipodes and the Far East. The fifth route, from the Straits of Magellan, is now shorn of its former importance by the Panama Canal, but will still have its value if the Canal should for any reason be denied to our ships.

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The Southern Group.

In the South Atlantic group of communications our sea-routes present at the moment no particular strategic problem. Whether the development of French power in North-West Africa will in the future affect adversely the potential security of our sea-routes between Gibraltar and St. Helena remains to be seen. The Empire is well served with coaling stations and harbours of refuge in this area, Sierra Leone in particular being well placed with regard to both the South African and South American trade routes. The importance of the South African route to the Empire as a whole lies—as do the Magellan Straits in relation to the Panama Canal—in its availability for communication with the Far East should the Mediterranean Sea or Suez Canal be barred to our shipping.

Although outside the scope of Imperial communications, reference must be made to French developments in North-West Africa, as they may in the future have a bearing on British inland communications in that continent. Immediately after the war France initiated far-reaching schemes for the exploitation of her possessions, some of them newly acquired, in Africa. In doing this she had as motives not only commercial expansion, but also the urgent need of colonial troops to augment the French army on mobilization. Her first step was the survey of a line of railway from Oran on the Mediterranean across the Sahara to Wagadagu, 400 miles south-east of Timbuktu. This town is eventually to be the junction of lines connecting with the existing sections in Senegal, French Guinea and in Dahomey, and possibly with the British Nigerian railways. With this line in existence the communications of France with the great reservoirs of man-power south of the Niger would be assured, always presuming that the 400 miles of sea between Algiers and Marseilles are secure. At the same time the French have turned their attention to the development of roads and of mechanical transport. The pioneer journeys of the Kegresse-Citroen cars across the desert from Algeria to the Niger will be remembered in this connection. A trunk road has been suggested to run from the neighbourhood of Lake Chad southwards through Fort Arlchambault to Bangui on the River Ubangi, thus linking up with the communications based on the River Congo.

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As a corollary to the improved land routes France has proposed an airship route from Paris by way of Algiers and Dakkar to Pernambuco in Brazil. It can be seen from the foregoing that France is making serious efforts to link up efficiently her great African territories with the home country. The more important those territories become the more vital to her is the sea-gap between Algiers and Marseilles. This will have a serious bearing on the French maritime and air policy in the Western Mediterranean, already a matter of some moment.

To return to Imperial communications in South Africa. The Cape—Cairo route is still, in its complete form, a thing of the future. The trunk line runs northwards from Mafeking to Buluwayo, and then on to the Victoria Falls and Broken Hill in Northern Rhodesia. It then enters the copper province of Katanga in the Belgian Congo and has for a rail-head the town of Bukama. Sections of railway already bridge the unnavigable reaches of the Upper Congo between Kongolo and Kindu and again between Ponthierville and Stanleyville. It but therefore remains to connect Bukama with the navigable upper waters of the River Congo to enable a direct connection to be made between Cape Town and Stanleyville by rail and steamer. From Stanleyville a line has been projected to run to Lake Albert Nyanza. With this and with the addition of a length of railway to bridge the rapids of the Upper Nile between Nimule and Rejaf the connection of the Cape and Cairo by rail and river will be complete. To connect South Africa with Upper Egypt by a continuous line of railway is an undertaking which cannot yet be considered as a commercial proposition. It would be difficult to obtain an adequate return on the vast expenditure which this project would entail. Its strategic advantages are not sufficiently marked to justify the construction of such a line from Imperial funds. Lateral lines are already in being which connect with the Cape—Cairo route. The most important of these is perhaps the line constructed by the Germans from Dar es Salaam to Tabora and to Ujiji on Lake Tanganyika. Albertville on the western shore of the lake is connected by rail with the River Congo. Other important lines on the east are the Mombasa—Nairobi—Kisumu line in Kenya and the Tanga—Moshi line in North Tanganyika Territory. These two

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lines were connected during the war by a line running from Moshi to Voi in Kenya. It was proposed recently to dismantle this line but local agitation has induced the authorities to rescind their decision. On the west coast a railway runs from Benguella in Portugese Angola to Bihé. A continuation to the Katanga Province is projected. The company concerned in this venture is largely British. This fact has raised suspicions in the minds of the Congo authorities who see in this scheme a further British exploitation of the rich Katanga province, which is already dependent on the Rhodesian railway for the export of copper ore. As an offset a Belgian railway has been proposed to run from Bukama to the River Kasai, a southern tributary of the Congo. This would provide a rail and river link between Katanga and the sea on Belgian territory. The Cape—Cairo route already described was based on the pre-war political divisions. The war has brought about what Germany was always striving to avoid, the linking of Egypt and the Cape by a continuous stretch of British territory. A Cape—Cairo route through Tanganyika and Uganda would have the outstanding advantage of lying wholly in British territory, while putting those colonies and possibly Nyassaland in direct communication with the Union system. Connections with the coast would be provided by the existing lateral lines running eastward from Lakes Tanganyika and Victoria Nyanza.

Military operations have played their part in African railway development. During the Soudan campaign Lord Kitchener constructed the desert railway from Wady Halfa to Abu Hamed which now forms part of the route to Khartum. During the late war the South African system was connected with the German South West African railways to facilitate the operations of the Union forces. An interesting feature of African communications is the recent development of road construction, caused doubtless by the increasing use of mechanical transport. The French efforts in this direction have already been noted. A motor road has recently been opened in the Northern Congo, which, running from Buta to Rejaf and Mongalla in the Sudan, bridges the Congo—Nile watershed. It forms with the River Congo a link between the Atlantic and the Upper Nile. Mongalla is already connected by road to Nairobi in Kenya so that a complete overland link on the Equator between

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the Atlantic and Indian Oceans is now in existence. In the south a motor road is projected to run roughly parallel to the line of the proposed Bihé—Katanga railway. It may be that motor roads will in a measure replace railway construction, as they are cheaper to construct and maintain, besides being available for varying forms of land transport. It is difficult to see, however, that railways can be dispensed with when the development of a country has proceeded to an extent involving transport movements in bulk.

The Eastern Group.

The great eastern route is perhaps our most important line of communication. For more than a century our foreign policy has been largely directed towards the maintenance of the difficult section from Gibraltar to Egypt. Our political and military operations in the Near East, including the Crimean War and the late near eastern campaign, can all be regarded as in protection of this section of our communications from enemies potential and actual. In view of the immediate proximity of foreign countries along the Mediterranean littoral the need for military and naval forces in this sea is obvious. Gibraltar and Malta are but sentry boxes for the protection of this route. Egypt has been called the "Clapham Junction of Imperial Communications." Here are grouped not only important aerial and signal establishments, but also the vital and delicate link of the Suez Canal. Once out of the Red Sea, guarded by Aden, we are in what is virtually a British sea. The Indian Ocean sea-board is now nearly entirely British, and can therefore be regarded as one of the safest areas in war for our shipping. Both Germany and Russia made unsuccessful attempts before the war to gain access to this sea from Europe, Russia by way of Persia, Germany by way of the Baghdad railway.

The future of the southern section of the Constantinople—Baghdad railway as an Imperial line of communication depends on our future policy in Iraq. We have an important interest in Lower Iraq where the port of Abadan provides for the export of oil from the Anglo-Persian fields, in which the British Government has a large holding; but we have said that we will evacuate the greater part of the country within four years. Even if we do not do so a British trunk route from Alexandretta to Basra is not practicable,

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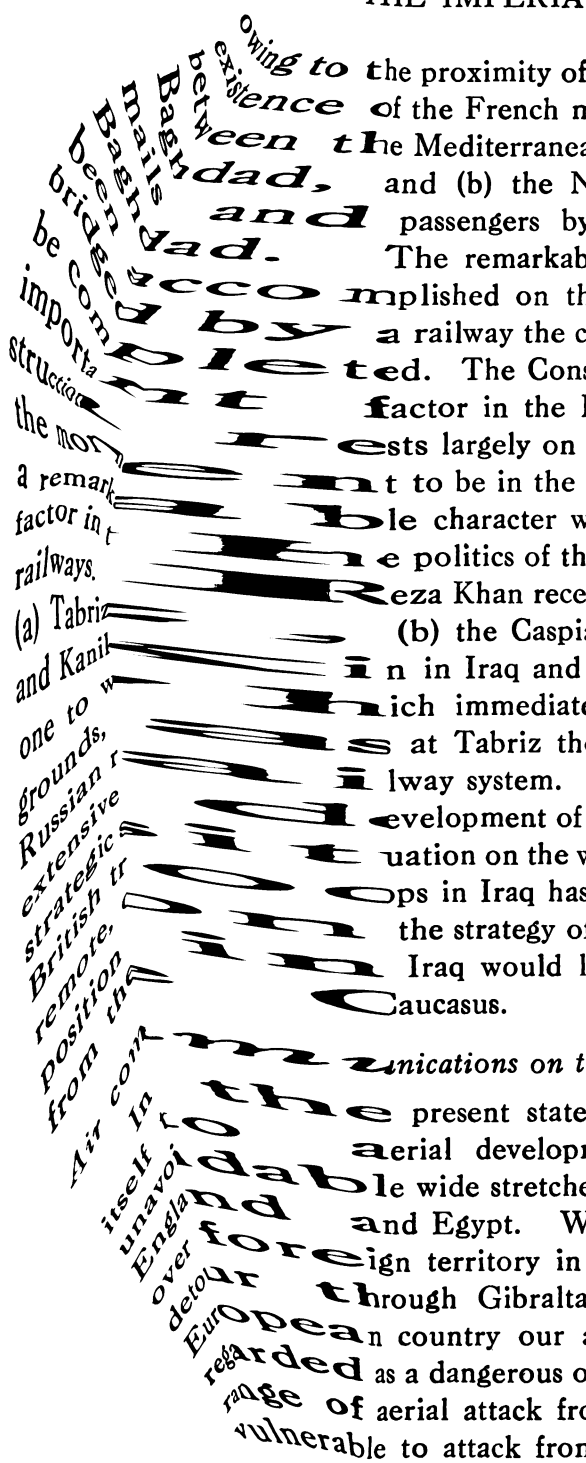

owing to the proximity of the Turkish frontier in the north and the existence of the French mandate in Syria. Two British links exist between the Mediterranean and Iraq, (a) the air line from Cairo to Baghdad, and (b) the Nairn Transport Company which carries mails and passengers by motor transport between Beirut and Baghdad. The remarkable record of 614 miles in 16½ hours has been accomplished on this route. If the gap Basra—Duzdup is bridged by a railway the connection between Europe and India will be completed. The Constantinople—Quetta line would be a very important factor in the Middle East. The possibility of its construction rests largely on the destiny of Persia, and that appears at the moment to be in the hands of Reza Khan, the Prime Minister, a remarkable character who, if he survives, may be an important factor in the politics of the middle east. Persia is almost devoid of railways. Reza Khan recently proposed the linking of Teheran with (a) Tabriz (b) the Caspian Sea at Mahmudabad, (c) Kermanshah and Kanikin in Iraq and (d) Basra. Of these the first is the only one to which immediate objection could be taken on strategic grounds, as at Tabriz the proposed line would connect with the Russian railway system. It must be remembered however that an extensive development of communications in Persia would alter the strategic situation on the western frontier of India. The presence of British troops in Iraq has an effect, although perhaps indirect and remote, on the strategy of the defence of the Indian frontier. Our position in Iraq would lie on the flank of an advance on India from the Caucasus.

Air communications on the Eastern route.

In the present state of aeronautics the eastern route lends itself to aerial development principally because there are no unavoidable wide stretches of sea. The difficult section is between England and Egypt. We are faced with the necessity of passing over foreign territory in France and Spain or of making a wide detour through Gibraltar. In the event of war with a south European country our air-route in the Mediterranean must be regarded as a dangerous one. Both Malta and Gibraltar are within range of aerial attack from foreign bases. Malta in particular is vulnerable to attack from either Italian or Tunisian aerodromes.

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Egypt is a very important junction for existing and proposed middle east air routes, notably that from Cairo to Baghdad, which is in regular operation for mails and is one of the best known and most successful of our oversea air-ways.

Two civil aviation schemes are now in course of development. (i) The Burney airship scheme is under the aegis of the Admiralty, and is destined to provide an airship route to India. This scheme after many vicissitudes has again received the active support of the government. An airship is being reconditioned for trial flights and other experiments are being undertaken. The history of dirigible airships since the war has been one of misfortune. Just as public confidence in airships is being restored some terrible disaster occurs such as that which overtook the French ship "Dixmude." (ii) The aeroplane side of civil development is represented by the Imperial Air Transport Company, a new corporation combining the several existent English companies. At present their activities are confined to the routes between England and the Continent, but doubtless a further development of their activities will involve the exploitation of the eastern route. At the general meeting of the Orient Steamship Company early this year the chairman said that he thought that the mailship companies would welcome the co-operation of aircraft as a means of accelerating the mail services. The mail planes could fly from England to, for instance, Egypt, where the mails could join the ships. This is probably the form that a regular aeroplane service in the Mediterranean would at first take.

It has been said that with the introduction of air lines the Empire would gain immeasurably by the contraction of distances. This may be true of the future, but one is struck by the present shortness of flights. Their length and duration is not of a nature to compete seriously except in special instances such as the Cairo—Baghdad line, with other forms of communication. When a machine can do with absolute certainty and ease a non-stop flight of 2 days and will not be always apprehensively and anxiously looking for the next landing ground, then it will be a serious competitor with sea and rail in the Imperial scheme. For Imperial purposes the airman's fear of the sea must be obviated. At present our

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airways are more or less all over land. With our scattered Empire aeroplanes must be able to cross wide stretches of sea with the same regularity and certainty as steamships. Not until that stage of development is reached will aircraft become a prime factor in Imperial transport.

Railways.

When Lord Kitchener visited Australia at the invitation of the Commonwealth Government, to advise on defence measures, he Critic the Australian railway system by saying that it was more a hotbed to assist an invasion than the defence. The two outstanding weaknesses are (a) that the lateral lines are within striking distance of the coast and (b) that in each state a different standard gauge is met with. The first difficulty can only be slowly overcome by the construction of lateral lines connecting the heads of the numerous branches which press inland from the coast. This is too costly a project to be undertaken purely from strategic motives and must be proceeded with as the hinterland is opened up. The progressive population of the hinterland by white settlers has thus a direct bearing on this aspect of the defence problem. A scheme is now on foot to unify the gauges of the Commonwealth. This is a reform which is urgently required to expedite inter-state commerce, and which will meet the second of the strategic objections raised by Lord Kitchener. The cost will be between £37,000,000 and £51,000,000 according to the standard gauge adopted. It will be difficult for the small Australian population to find this large sum. The completion of this task must therefore take time to accomplish. The completion of the trans-continental line from north to south is intended. Sections are already in existence: in the south from Port Augusta to Oodnadatta and in the north from Port Darwin to Katherine. The construction of this line by the Federal authorities was an element in the agreement by which the Northern Territory was separated from South Australia. It will do much to connect the isolated north with the south. Its strategic value is obvious, and much is hoped from it commercially in opening up Central Australia. A further line is proposed to link Port Darwin with Queensland by way of Daly Waters, Camooweal, and Cloncurry.

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The Nervous system of the Empire.

Cables.

The actual routes followed by cables correspond generally to the shipping routes. It is unnecessary to go over this ground again. It may be of value, however, to refer to one or two of the salient historical features. The first English submarine telegraph cable was laid from Dover to Sangatte in 1850. The success which attended this scheme encouraged the laying of an Atlantic cable. It was not however until 1866 that a successful trans-Atlantic cable was completed. Thereafter the development of cables was rapid. In 1891 the London and Paris telephone systems were linked. By 1896 the cable systems, except in the Pacific, had reached the existing stage of development. The Colonial Conference held at Ottawa in 1894 proposed that Canada and Australasia should be linked by an Imperial cable. A committee of representatives of the Imperial and Colonial Governments was appointed in 1896, which resulted in the completion of a state-owned Pacific cable in 1903. This important link in the "all-red route" runs from Victoria, B.C., through Fanning and Norfolk Islands to New Zealand and Australia. Meanwhile in 1898 the United States had acquired Guam and the Phillipines from Spain as a result of the Hispano-American war. By way of a reply to the Imperial Pacific cable the United States in 1904 constructed a cable running from San Francisco via Honolulu to the Phillipines and the Far East. One of the stations on this route, Yap, was the subject of a prolonged controversy between the United States and Japan in 1921. Yap, lately belonging to Germany, had been ceded to Japan, being one of the ex-German Pacific islands lying north of the equator. The United States were unable to agree to one of their important cable stations being in the hands of Japan. A solution was eventually found by giving extra-territorial rights in Yap to each of the powers—United States and Holland—which owned cable establishments there.

A further step in the development of the "all-red" route was taken in 1918 when the Imperial War Conference of that year recommended that, for economic and strategic reasons, a state-owned Atlantic cable should be laid down. This has now been completed, though the fact of its existence is not very generally

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known. This was brought out in one of the resolutions of the important economic conference of 1923, which pointed out that the Dominions interested in the Pacific cable had long pressed for a corresponding Atlantic link. Now that this link had been provided all possible support should be given to it by the governments of the Empire.

Having dealt briefly with the Imperial cable system a few observations on the international situation may be offered. The cable communications between the eastern and western hemispheres are nearly entirely in the hands of Great Britain and France. Of these a very large proportion is owned by the great association of companies known as the Eastern Telegraph Company. The great bulk of signal traffic between Europe and the Far East passes over submarine cables, but two overland routes are in existence and handle their share of the traffic. (a) The Siberian route via Petrograd and Moscow to Vladivostok which is owned by the Great Northern Telegraph Company of Denmark. This line has been re-conditioned since the war. Telegrams can reach Shanghai from London by this route in two hours. (b) The Indo-European route, owned by a British company, which joins the European system at Odessa and runs via Caucasia, Teheran and Bushire to India, is again in working order. The weakness of these as well as of other continental trunk lines lies in the probability of their interruption in war, thereby throwing an extra load on the submarine cables. During the Great War the world's cable system was practically controlled by the allies. They were able to exercise an effective censorship on telegraphic correspondence and thus control enemy trade and detect espionage. Germany realized the situation before the war, but she did not anticipate the full effect in a war of exhaustion. The results have apparently not been lost on other nations, who, since the war, have all hastened to establish long distance wireless communication on their own account.

Wireless.

The technical development of wireless has been rapid as compared with that of the submarine cable. Signor Marconi began his experiments in England in 1896. In 1901 the first Trans-Atlantic stations were opened. By 1920 ten main trans-ocean routes were

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in operation, of which eight were in the Atlantic and two in the Pacific. Notwithstanding the rapid development of wireless the formation of a comprehensive Imperial system has been slow and is still far from complete. It may be of interest to sketch briefly the vicissitudes of the "Imperial Wireless Chain."

In 1910 the Marconi Company applied to the Colonial Office for licences for the erection of eighteen wireless stations in the Empire. The Government decided that an Imperial scheme of this magnitude should be in their own hands and not in those of a company. In 1912 an agreement was concluded with the Marconi Company for the erection of six high power stations. The details of this agreement were severely criticised in Parliament and a select committee was appointed to report on it. A revised agreement was drawn up in 1913 and ratified by the Imperial and Dominion Governments concerned. The agreement provided for the erection by the company for the government of six stations in England, Egypt, East Africa, South Africa, India and Singapore. The scheme was shelved during the war. In 1919, Government ordered the completion of the English and Egyptian stations, begun before the war, and appointed a committee to prepare a complete scheme of Imperial wireless communications. The committee, reporting in 1920, recommended a scheme of communication via Egypt with India, the Far East and Australia, on one hand, and with East and South Africa, on the other. The Committee rejected a proposal by the Marconi Company for direct communication between England and India, Australia and South Africa respectively, in favour of a chain of stations spaced about 2,000 miles apart. This Imperial chain was to be a government service.

The scheme however did not find favour in the Dominions. It was felt that the link in Egypt presented elements of strategic weakness in view of recent constitutional changes in that country. Moreover a new factor had intervened. Up to a very recent date the question of a 2,000 or a 4,000 miles "gap" had been a subject for discussion, but, technical improvements proceeding apace, a 12,000 miles "gap" had become a commercial proposition. The situation was entirely altered. Other countries, notably France, America and Germany, had each several high power stations in

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operation. There was a strong feeling in Australia, South Africa and India in favour of direct communication without intermediate points. Australia and South Africa despaired of an early decision and made their own arrangements to communicate direct with England. The Marconi Company had already made arrangements with the Canadian Government for the erection of a station in Canada. Meanwhile the first link, Oxford—Cairo, of the old scheme had been completed and was in operation. The Imperial Government accepted the action of the Australian and South African governments as a fait accompli, and announced their intention of proceeding with the erection of stations in England and India, but of deferring or reconsidering the stations in East Africa, Singapore and Hong Kong. The details of this scheme did not altogether satisfy the Dominions, so, after strong expressions of opinion by Dominion premiers at the Economic Conference, 1923, the government appointed a further committee which early in 1924 issued a comprehensive report and recommendations on the whole subject. The committee recommended, inter alia, that the action of the various Dominion governments should be acquiesced in, that the Imperial Government should provide adequate facilities in England, and that all wireless stations in England should be under government control. As an alternative they recommended that private enterprise in the establishment of communications with the continent of Europe should be permitted and that the service which the Marconi Company had established with Canada in competition with the Post Office should not be intefered with. The present government have accepted this report. Meanwhile technical improvements have again intervened and may modify the plans of the government. The short wave directive or "beam" station is now a commercial possibility. Australia, South Africa and Canada propose to build "beam" stations in lieu of the high-power stations, although at the moment the latter alone are able to keep up uninterrupted communication throughout the day. The "beam" station does not therefore fulfil strategic requirements as does the high-power station. The government are, it is understood, prepared to encourage the Marconi Company in this new development, by agreeing to acquire a "beam" station in England if it is successful.

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Comparison of cables and wireless.

In comparing the respective values of cables and wireless the following points may be borne in mind.

(a) Cables are secret in operation and nearly entirely reliable. Wireless on the other hand from its nature can be intercepted. It is liable to interference by "jamming" and by "atmospherics."

(b) Cables have a high degree of vulnerability, cables, stations, and cable ships can be damaged by enemy naval action. Wireless stations, on the other hand can usually be situated where the risk of interference from the sea does not exist.

(c) Wireless promises to be cheaper to run than cables. The Australian wireless rates are expected to be 33% cheaper than cable rates when the high-power wireless is in operation.

Conclusion.

No argument is necessary to prove the prime necessity of the efficiency of our means of transit and communication. Speed, reliability and cheapness are the desiderata. Where these factors obtain we have an efficient communication system not only in peace but also in war, except for one thing, vulnerability. This is the one particular in which a line or means of communication perfect in peace may not fulfil the requirements of the nation in war. Modern war is no longer the perquisite of armed forces alone, it is a business in which every individual of a nation is involved. Self-interest, if nothing more, demands that our Imperial defences should be as perfect as our means allow. Every fresh development of our resources, and particularly of our communications, must be examined from the view-point of the defence of the Empire and not purely from a commercial aspect. It is in reconciling commercial interests with defensive requirements that difficulties arise. The insistent demand for economy has and will prevent our reaching perfection by the construction of purely defensive and commercially useless means of communication during a time of peace. We have therefore to rely on the ordinary means of commerce as the framework of our transportation and signals

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in war. The question of industrial mobilization is one which is assuming great importance and will assume still greater importance in preparation for war. This is now realised by all the great industrial combatants of the last war, each of whom in a greater or less degree, is devoting time and energy to a study of the subject. The mobilization of our transportation and signals is no less important.

We are going through a period of change. It may be that our actions during the next generation will decide whether our Empire is to continue as an Empire, or whether our oversea dominions will drift away, or throw off the slender bonds which bind them to the mother country. History repeats itself. In the stories of past civilisations we see that where the bonds between the homeland and the outlying dominions weaken and snap, so does the power and prosperity of that country begin to wane. As long as our Imperial links remain intact and strong so long will our Empire conserve its greatness.

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A BATTERY COMMANDER'S WAGON.

By Lieut. R. A. King, R.A.

THE need for a battery commander's wagon in moving warfare has long been felt. This need goes on increasing owing to the continual addition to the B.C's staff of instruments and gadgets which have become too heavy on the person or horse. The ordinary member of a battery staff is heavily laden, and although this is not so important at home, in India the equipment is a constant source of discomfort to man and horse and, except in the cold weather, is well-nigh impossible to carry. This was undoubtedly the primary force in introducing the limber G.S., which is a post-war economical make-shift. It serves its purpose as a receptacle for odd stores during manœuvres and on the march.

Next the old need for some sort of portable observation ladder was felt. One or two experiments were made and an observation pole was erected by some batteries on the limber G.S. These lacked height and stability owing to the lightness of the base. And finally the need for the carriage of a small wireless receiving set. For this the limber G.S. is eminently unsuited.

In considering the requirements of the ideal B.C's wagon, one is confronted with several difficulties. In all there are five main requirements to be met:—

(1) To carry battery staff stores and spare signalling equipment during manœuvres and, over and above this, to carry a considerable proportion of the heavy stores, carried by the staff, when on the line of march.
(2) To be capable of carrying a wireless receiving set, with which one can receive messages either on the move or at rest.
(3) To carry some pattern of observation structure.
(4) To carry the two Lewis guns and ammunition.

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(5) If possible to carry some arrangement for the laying of cable, similar in principle to the cable cart but on a much smaller scale.

Two vehicles are really required for the above. One to fulfil the conditions of 2 and 3 and to carry the battery staff stores less signalling equipment. The other to fulfil the conditions of 4 and 5 and to carry the spare signalling equipment. This would simplify the problem of the detached section. With a slight redistribution of stores one could remain with the battery and the other accompany the detached section.

In these times of financial stringency there is no hope of batteries being allowed an extra four horses and two drivers; so, as far as possible, one wagon will have to fulfil all conditions. This wagon would be easy to construct, and no doubt a carriage factory, if given the requirements, could offer a suitable design. The only difficulty, which appears to be unsurmountable, is that of cable laying. This is not meant as a substitute for the normal method of laying out cable between battery positions and O.P's, but as a means of laying out other lines, often for other purposes. If this is put on the body, where the wireless is, the latter will have to go where you want to lay cable. If placed on the limber, the body will interfere with the laying and reeling in. Moreover, as soon as the battery comes into action, the wireless will be wanted at the battery and the limber at the O.P. The only way to overcome this will be to put the cable apparatus on a light trailer, which can be hooked on behind the B.C's wagon or any other wagon or limber. So if the limber of the B.C's wagon is not available any other wagon or limber would do. The trailer should be light and be provided with a couple of handles so that, at a pinch, it could be used by hand.

The B.C's wagon has two main disadvantages. All one's eggs are in one basket. Secondly, when sections are detached, portions of the stores will have to be moved over from the wagon to the personnel or the vehicles of the section detached. To overcome this difficulty a standard set of stores could be carried in a signalling pannier or something more suitable, which could be quickly transferred across to the section detached. This would serve the purpose in nine cases out of ten. Any additional stores could be handed over to the section staff or strapped on the footboards.

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Unfortunately shortage of funds interferes with this ideal and a substitute has to be sought. This presents itself in the form of a converted 18 pounder ammunition wagon. All the ammunition baskets, trays and compartments are removed and the interiors are then shelved off to take the various stores that are usually carried in the limber G.S. The limber has two legs on the top of the box so that it can be up-ended and used as an O.P. The pole has a metal strip running the length of its upper surface. On this are fastened small steps which fold flush with the pole when in the travelling position. These can be unfolded one by one as the person climbs upwards. On the top is a small plane table and a little lower down a bicycle seat for the B.C. These are normally carried strapped on the limber. This arrangement is not novel. Some prefer a wire rope ladder. Its disadvantage is that it requires time to put up and everything must tend towards speed. The ladder itself measures 5′ 6″ from top to bottom rung, so it can serve no other useful purpose. It has been suggested that a modified periscope be carried the length of the pole so that the B.C. can, if necessary, enjoy the view obtained from the top, while down below under cover.

The distribution of the stores is as follows :—

In and on the limber.

Bags spare parts	1	Rules sight 16″ with case	1
Boxes ammunition	4	Solution rubber 3oz. tubes	3
Guns Lewis, complete with chest	1	Sticks crook short	1
Bags shutter signal complete	1	Switch unit buzzer 4+3	1
Capsules microphone	1	Tape rubber pure 4oz tins	2
Cartridges illuminating	36	Tape insulating adhesive 1lb.	2
Climbers pole	1	Telephones portable D III	1
Lamps signal daylight (Lucas)	1	Torches electric	1
Periscopes No. 14 with case	1	Tubing rubber $\frac{3}{8}$″ ft.	1
Pistols signal	1	Wire electric S 2 Mark 3., yds.	3
Poles flag army 3′ 6″	4	Plane table for observation pole	1
Plugs for buzzer switch unit 4+3	1	Bicycle seat for observation pole	1
Rangefinder artillery with case	1		

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In and on the body.

Bags spare parts	1	Poles flag army 3′ 6″	4
Boxes ammunition	4	Plugs for buzzer switch unit 4+3	4
Guns Lewis, complete with chest	1	Solution rubber 3oz tubes	4
Bags with shutter complete	3	Sticks crook short	1
Drums cable	4	Strips ground	12
Capsules microphone	1	Switch unit buzzer 4+3	1
Cartridges illuminating	36	Tape rubber pure 4oz tins	2
Cells electric inert spare	112	Tape insulating adhesive 1lb.	2
Cords telephone D III spare	1	Torches electric	3
Cans oil ½-gallon filled	1	Telephones portable D III	1
Lamps signal daylight (Lucas)	3	Tubing rubber ⅜″ ft.	3
Pistols signal	1	Wire electric S 2 Mark 3, yds.	9

Field service marching order stores carried on the vehicle.

Hooks bill switching	1	Collars breast	1
Axes pick 6½ lbs.	2	Traces wire adjustable long pairs	1
Spades Mark 3	2	Traces wire short pairs	1
Brushes water carriage	1	Straps loin lead	1
Boxes grease 14lbs.	2	Bars supporting pole draught	1
Cans oil No. 3	2	Swingle trees	1
Poles draught No. 18	1	Spanner No. 93	1
Handspikes common 6ft.	1	Ropes drag light pairs	1
Lines hambro	1	Pawlins 6½′ by 6½′	2
Lines white 1lb. skein	1		
Buckets water canvas	6		

The Lewis guns are fastened on to the footboards by a couple of quick release catches so that either the Lewis guns can be taken out of the boxes or the whole can be removed together. Boxes P.T. signal equipment have been omitted owing to lack of room. The above is a very fair distribution of stores. Nearly any article required can be obtained either from the limber at the O.P. or the body at the battery.

The two wireless operators sit on the body and two Lewis gunners on the limber. On the battery coming into action the body

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is dropped in rear, or to the flank of the battery position, the Lewis gunners for this gun being found from the battery when it arrives. The limber proceeds to the O.P.

As compared with the limber G.S. the following are the pros. and cons. The advantages of the limber G.S. are :—

(1) It is slightly lighter than the B.C's wagon.
(2) It carries a spare wheel which the wagon does not.
(3) The two Lewis guns are in the body at the battery which is the normal procedure. The Lewis gun of the wagon limber can be dropped at the battery position before proceeding to the O.P.

The advantages of the B.C's wagon are :—

(1) It is a much stronger vehicle and will stand the wear and rough going of an ordinary ammunition wagon, which a L.G.S. will not.
(2) The pole is used for observation purposes.
(3) The interior, where the bulk of the stores are carried, is proof against rain, dust, water, etc.
(4) Every store has its own compartment and can be easily got at. They would not be injured by fast or rough travelling.
(5) The material from which the wagon is made is proof against shrapnel, rifle fire, splinters, etc., so one's stores are not so likely to be damaged.
(6) Spare harness, trenching tools, etc., are carried.
(7) Its stability is better than that of the L.G.S.
(8) Four men can ride with comfort on the vehicle. Even six could be accommodated for a short time. Only two can ride on the L.G.S.
(9) The body has a wireless receiving set.
(10) With the L.G.S. all one's spare signalling stores are in the limber at the O.P. The bulk of the signal stores are required at the battery position, because in addition to the O.P.—battery terminal there is the brigade—battery terminal, i.e., two terminals to the O.P's one. Also, if a

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section is detached, spare stores must be available at once on the battery position for handing over to the section concerned.

(11) If a quick move were to take place it would not be necessary, in the case of the B.C's wagon, for the limber to go back to the battery position. The body could be hooked on behind one of the firing battery or first line wagons. This cannot be done with the L.G.S.

The comparative costs of the limber G.S. and the B.C's wagon have not been gone into, but there must be hundreds of ammunition wagons lying spare in the various depots and arsenals at home and in India. The cost of conversion is slight, and although defects are bound to become apparent, everyone will admit that this is a progressive step towards the attainment of the ideal B.C's wagon which will make its appearance at some future date.

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AN INSTRUCTIONAL MODEL.

By Captain R. Blewitt, d.s.o., R.A. (T.A.)

THE accompanying photographs of a model battery are put forward in the hope that the idea may be of interest or even of value to some of those whose jobs include, amongst other things, teaching young Territorial officers or men of either regular or territorial units. The model is designed to simplify the learning of A.T., Vol. II, Chap. VII, i.e. methods of laying out lines of fire, choice of aiming points, corrections for parallelism, position corrections, etc. It does not deal with problems of angle of sight. The outfit (see Plate 1) consists of a battery board, four guns, director with stand, and target board. The model can with advantage be used with a real director and plotter.

The battery board consists merely of a board with holes in it to receive the guns and director. The letters are for descriptive purposes only. The holes B, C, F, H and J are bored at normal gun intervals at a scale of 1/100. This is important as a full realisation of the scale on which the model is worked is a sine qua non for its proper use. The remaining holes are bored more or less hap-hazard either for the director or for demonstrating problems of guns at irregular intervals. The board has a fitting for a tripod (Plate 2) and three rubber feet for use on a table (Plate 3). The "guns" are sections of tubing fitted into wood "carriages" on the top of which rotates a reading plate divided into ten degrees. This reading plate has a sighting arrangement on it and the pointer for the scale is on the carriage. Plate 4 shows one of the guns in detail. The director is similar to the guns but has no "piece," and the scale is on the carriage and the pointer is on the rotating top.

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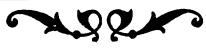
It can be used on its own stand (Plate 4) or on the battery board. Plate 3.) The target board is merely a board marked off at gun intervals to scale which can be used as in Plate 3 for checking parallelism or can be clamped on a walking stick as in Plate 1 and stuck in the ground outside the window at a suitable range (to scale) as a target.

With care the model shown can be worked with a maximum error of about one degree, but it is suggested that principles are better demonstrated by gross exaggeration of faults than by trying to work down to the limits of accuracy of what is after all only a home made toy.



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INTERCEPTED CONVERSATION. *

Scene.—A practice camp. Four battery officers hopelessly watch the drifting mist which obscures the range.

Senior Subaltern. You won't get your second shoot to-day. If you do, I hope it will be H.E. Your arguing at the pow-wow put the lid on your shrapnel effort.

Last joined Subaltern. It is difficult not to argue when you think you are in the right. I thought my shoot pretty good.

S.S. It was a rotten shoot; your bursts were nearly all too high.

L.S. That is just where I disagree. I think we generally go for too low a burst when firing for effect.

S.S. You won't get many people who saw German high bursts to agree with you. There is not much wrong with our 10′ height of burst.

L.S. I can never get past those German high bursts. Whenever I suggest that 10′ is too low, up goes a barrage of German balloons and my whole argument is neutralised before it has really begun.

S.S. What is this rotten argument of yours?

L.S. Well if you look at Artillery Training, Vol. 2, you will see that it admits that a higher burst is needed at long ranges, and it implies the same, though it does not definitely say so, for targets which cannot be ranged on accurately. Most favourable targets can't be ranged on accurately. Either there isn't time (they won't wait while you range) or you can't observe enough, or they are distributed in depth.

S.S. What height do you suggest?

L.S. I have worked it out on a basis of adequate striking velocity. A.T. works it out on a desired density of one bullet to six square feet for a shell burst at the mean height and then fudges the answer a bit to avoid too many grazes. In other words A.T. legislates for the needs of a particular type of target which you seldom get and allows a variation for other types.

S.S. You are a bit revolutionary, aren't you?

* With apologies to the Quarterly Artillery Summary.

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L.S. Perhaps: youngsters often are. Look here. It is wasteful to have your bullet density too great. That is the trouble with shrapnel with the steeper angles of descent. I can correct this by raising the burst, and if the bullets will kill, I can't see that it matters twopence whether I kill every man in a small area or every other man in an area twice the size. I am going to fire more than one shell in each area.

S.S. You will be burned at the stake as a heretic if you don't take care, but you haven't yet told me at what height you want to have your bursts.

L.S. I have worked out these heights as being the highest from which you can expect 18-pr. bullets to kill:—

Range.	*Height of burst.*
3000	24′
4000	30′
5000	38·5′
6000	40′

I should put the mean height at half these, and so get the maximum possible number of shell bursting so as to give killing bullets, and at the same time reduce the number of shell with an unnecessarily close pattern.

S.S. You won't get many grazes.

L.S. I'll get just as many as I want depending on the need for them. When I want grazes I will order "percussion" from one gun. If you want a percentage of smoke, you don't just jumble up your smoke with your other shell and hope for the best. Sometimes you don't want any grazes at all. You may see the splash of the bullets or you may not be able to see grazes if you get them.

S.S. That is a one-sided argument. Grazes are needed to tell you about your height of burst as well as where your M.P.I is.

L.S. A.T. doesn't think much of percentage of grazes as a guide to height of burst. It seems to me a last resort to be used in close observation. We have graticuled glasses and if we cannot estimate the mean height with them we are not much use as observers.

S.S. I don't admit that, but anyway you would only raise the mean height 5′ at 6000 yards.

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L.S. Yes, but 5′ means 25 feet in height at that range, and I get rid of some rotten low bursts with no spread of bullets, besides some useless grazes.

S.S. I suppose you used the Table at the top of page 87 of Volume II.

L.S. Yes, I did.

S.S. The book says that it isn't reliable.

L.S. No. It's pessimistic. The optimistic view for the 18-pr. at 6000 yards is that the bullet at burst has 800 f.s. velocity due to the remaining velocity of the shell, and 100 f.s. additional velocity due to the bursting charge. The bullet loses 150 f.s. of velocity every hundred yards, and is going strong at 250 yards from the point of burst, instead of the 190 yards of the cautious A.T.

S.S. Whatever you argue, I can't say I believe in high bursts.

L.S. I didn't think you would. You can't forget those German balloons. But high bursts are sound all the same within limits.

Exeunt Subalterns.

Capt. That lad is too exuberant. Why can't he do what he is told without arguing about it.

Major. There is something in what he says and anyway a spirit of inquiry is a good sign. The H.E. advocates have discouraged the study of shrapnel.

Capt. I've never worried about it myself. I try to burst my shell at 10′ and leave the question of effect to the enemy.

Maj. "For Simplicity," as Artillery Training has it. The average gunner officer, being, I take it, cast for the part of "Simplicity."

Capt. And a good job too.

Maj. Perhaps, but let's be serious for a moment. To arrive at a theoretical best height of burst you can work from requirements of bullet density or of striking velocity. In other words you must choose whether you want the greatest number of shell giving impenetrable screens or the greatest number of effective bullets. [As a matter of fact the answer is not very different with flat trajectories, but for howitzer shrapnel or long range fire the difference is appreciable.]

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Capt. I'm not an H.E. man, but I'd never fire shrapnel in those two cases.

Maj. Where would you draw the line? If we are to fire shrapnel, we ought to know more about it and the trouble is that we seem not to know enough about the loss of velocity of shrapnel bullets or their distribution. Their behaviour is capricious. But certainly it is the case that sufficient emphasis is not laid on the fact that the 10′ height of burst is only an average and varies with the nature of the target and angle of descent. I should like to get away from theory and return, for some series at any rate, to the system of counting "throughs" on wooden targets.

Capt. I'm glad I'm too old to be a range officer.

Maj. There is another point which was brought out by General Rohne years ago, but has rather been forgotten since. When the angle of descent becomes more than half the angle of opening the depth of effect begins to diminish very quickly.

Capt. I'll take the old gentleman's word for it. I don't in the least see why it should.

Maj. It isn't hard to see. The furthest ranging bullets then start from a burst on a course below the horizontal, and as the angle of descent increases, we reach a point where H.E. gives more hits than shrapnel. We should learn more about this limit if we counted hits sometimes.

Capt. I see I shall have to think this out. A most disagreeable process. But what about covering fire.

Maj. That is another story—and our most important work. We were discussing fire for effect at men in the open or behind slight cover, without considering the modifications entailed by the nearness of our own infantry. But come and see my new horse.

Exeunt.

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SPORT IN INDIA.

COMMUNICATED BY MAJOR-GENERAL E. H. WILLIS, C.B., C.M.G.

I. PIGSTICKING.

I HAVE been asked to write an account of sport in India enjoyed by officers of the Regiment during the past few years, to show those who are stationed at home that good sport of all description is still to be had in this country. In order to make the account as comprehensive as possible, I have asked officers all over India for a short description of the sport to be had in their neighbourhood. Owing to the fact that so many are now away shooting, this record will not be complete; moreover certain well-known sportsmen in the regiment, whose views on sport and whose personal adventures have already appeared in print, have especially asked to be given an overslaugh. Sport in its best, its wildest, and most thrilling form is still to be found in India wherever men are ready to look for it. The wild boar—surely the bravest animal that lives—is still here to be hunted. Big game is in some places more plentiful than ever, thanks partly to the reluctance of many a dark complexioned Collector to take those risks to life and limb which the English civil servant took so readily. Duck and snipe, partridge and quail are in many places still plentiful, though the advent of the motor has opened up the country to the casual sportsman, and large bags are only obtainable off the beaten track.

Polo flourishes everywhere, and for pack batteries at least is not too expensive. Every garrison town has its race-meetings—there are many excellent horseshows, with jumping the chief attraction, rivalled only by a musical drive or vaulting display given by the nearest battery. Cricket, football, boxing and hockey are everywhere encouraged, and in these the gunners have never failed to pull their weight. The idea, too, that soldiering in India to-day is so much more expensive to a bachelor than it was in the past is really a very false one. I leave out the married man and allude to bachelors alone, as marriage is a luxury and should be treated as such.

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To prove my contention I would quote my own case: my ten years service as a subaltern was spent at home, in the Mediterranean and in Australia. I was most anxious as a youngster to get to India, but I knew that I could not afford it as a subaltern and I applied for my name to be placed on the list for India on promotion to captain. My father in those days gave me an allowance of £100 a year, yet I refused my jacket as a subaltern because I thought I could not afford to uphold the position. When I was promoted captain in 1900 I was sent to a battery at Allahabad. Immediately on arrival I started pigsticking, and was lucky in being initiated by that very sporting regiment the 7th Lancers, who, to encourage me, allowed me to get first spear on the first two hogs I ever saw. They were, however, the last spears I was allowed to get during that first season.

In any attempt to deal with gunner sport, mention must first be made of pigsticking, which is the sport par excellence that gunners have always taken up wherever pig are to be found in rideable country. I have been lucky enough to secure the following account of three seasons' pigsticking with the Meerut Tent Club, by Lieut.-Colonel Sutton, commanding the 11th Hussars, who is one of the most successful men after pig that the Meerut country has known.

"My regiment arrived in Meerut from Cairo in October, 1921. The difficulty of getting good polo ponies and the fact that I got one very good pigsticker from the 21st Lancers, decided me to confine my attention to pigsticking whilst at Meerut: a decision I have never regretted. From 1903 to 1908 my regiment was stationed in Ireland, and thrilled by the wonderful accounts of the sport I heard from John Watson, the master of the Meath Hounds, I had always longed to try my hand at it. I was lucky enough to pick up two real good horses and one green one for the first season, and these with the addition of a good hack saw me through the season well.

The season 1921-1922 started on December 8th, and the country of course at that date being very blind and thick, it was very difficult to find pig, let alone kill them. The number of spears throughout the season averaged about ten per meet and were practically entirely gunners, all "C" R.H.A., and Bates, Ritchie and John Sangar, 21st

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Brigade, R.F.A.: these with Colin West, late "C" R.H.A., the Honorary Secretary, Wallington, Royal Sussex Regiment, Percy Marsh, I.C.S., and the writer were the regular attendants. Old members may dispute the fact, but I doubt if the Meerut Tent Club has ever had such a killing lot of regular spears as in that season. To mention names is always apt to lead to trouble, but in my humble opinion the star performers were Freer, West, Phipps, Walker, Bates, Ritchie and Wallington: Marsh ever gallant as a pebble but not well mounted, got a lot of falls, many horses cut, and killed many pig. A. C. Brooke from Ambala Equitation School was out a few times and I consider him the quickest, quietest, best man after pig I have seen; we had a glorious season and I enjoyed every moment of it, except perhaps at first when I was frequently on the floor from not letting my horses really go, and helping them out of one difficulty into another. The early season was a bit cut up by the fact that nearly everyone was in Delhi for about a month for H.R.H. the Prince of Wales' visit.

The best meets as usual were Bijnore, Basantpur Bagh, Sherpur, Sherzipur and Dhariwala; at the former we killed 30 hogs, 5 parahs and 2 sows, both of which unfortunately fell to officers of the 11th Hussars! The one Colonel Lockett slew is rather a pretty story; in the heat were Walker, Lockett and self, after a big pig in pretty heavy grass. Walker was on and did the work, we novices at the game never gave it a thought, lots of bumping and boring and spear to Lockett, Walker very pleased, and saying we must mark the Colonel's pig, cut its tail off! At lunch time, the thirsty ones all drinking, West, Walker and self looking over about 7 dead hogs; Hon. Sec. suddenly said 'who the —— has killed a sow?' Walker said, 'anyway, we've killed two pig with our heat, Sutton marked his and I cut the Colonel's pig's tail off.' Tableau! and I believe Lockett half thinks to this day that Walker gave him away! The season ended in the second week in July and the total bag was 144 hogs. There were very few damaging falls, Ritchie broke his ankle early in the season, West ricked his back: Phipps supplied the comic (perhaps not to himself) element by getting his finger bitten off, in a gallant attempt to hold a wounded boar by the ears. As far as I remember, no very serious casualties to horses.

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The season 1922-23 opened with the Xmas meet, the spears were about the same as the previous one. By the death of Captain Freer, who was killed hunting while on leave at home, the Tent Club lost its finest exponent of the game. A fine, strong, determined horseman and a very gallant sportsman. This season we rather missed the best of the grass on Bijnore Island and killed only 17 hogs there. The Sherpur Sherzipur meet with 19 was our best; this is to my mind the cream of the country, miles of galloping grass, a veritable High Leicestershire of the game. There was one rather stirring evening on May 19th: we had been doing the Kadir Cup country for three days with a 29″ limit to try and kill a few big boars, but had only moderate sport. One evening Baboo had news of a hog in a bagh about 2 miles east of camp; a few went off on the chance in two heats; Wallington, Freer (a brother of poor old Freer, who is in the Alliance Bank at Meerut and a good boy to go) and self were in one heat which proved the lucky one.

A good hog went away at once; we had three hundred yards of beautiful maidan and then a sheer drop over the khud into Krisni jheel, where we slew him within 10 yards of safety. We slipped back again into our places, and another hog came and was stretched within 20 yards of the first. Back again and a third came in the devil's own temper, chased Wallington for 150 yards, with myself on his tail, but feeble from laughing at W. However I just got him a very heavy spear far back as he went over the khud and we slew him. This was what I call a real text book show of what three really fast horses can do with the help of heavy spearing; all three hogs were over 30″. I went home on leave May 26th and they hunted until early July. Total bag 136. Few casualties to man or horse, West broke a collar-bone, Wallington killed a very good horse in the Muttra Cup. Again I got through the bulk of the season on three horses and a hack, which was most awfully lucky.

The season 1923-24 saw a dreadful lot of changes in the personnel; "C" Battery have gone, replaced by "K," a real good riding lot; 21st Brigade replaced by 2nd, who have not had time to collect good enough horses to really strike a blow, with the exception of Vaughan-Hughes who knows the game well and goes really well. The men to annoy the hog most this season have been West, Yorke, Kemp, Vaughan-Hughes, Mansell, and Hugo.

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Paynter, who had a few days early in the season, of course showed us all how to do it.

I am not dealing with Kadir Cups. I'm a bit old and slow, but we killed 14 rideable pig the first day, which was a grand show. The first day of the Bijnore meet we got 14 and lost 3, a wonderful day's sport. June's sport was moderate, we had got round our country a bit quick. There were a good many panther on the Kadir this season; two were shot and one speared. The story of the latter was thus; A long line of four heats, panther up in front of the right heat. Four or five went for it, but their horses were not too staunch, the panther charged Hutchinson who speared it in the shoulder and kept it out; Percy Marsh (now Collector at Meerut) gave it a grand spear, but instead of galloping on, stayed and played with it (a trick he has), the panther mauled him badly in the leg and he did not hunt again this season. Percy, coming from the South of Ireland, dearly loves a dog-fight!

Two seasons ago self and Marsh were in a heat, mine was a very fast horse, Marsh's slow; I got first spear after a fast hunt over very easy short grass. Percy, coming behind, sings out 'well done, Squeak, your pig, now let *me* have him!' He wades in like a bull fight, gets his horse cut and slays the hog; no picador ever foaled went in with such determination.

Alas, we move to Risalpur in January and my short pigsticking career is about finished; I've always loved hunting, but I can honestly say I've never enjoyed three seasons better. One cannot compare the two; as the late John Watson once said to me, 'You can't compare them, they are different, but each in its own country stands far above any other form of sport.' This is from one who really knew. To my mind John was the finest amateur huntsman I've ever seen and of course one of the original international polo players. I love the Meerut Kadir; it's the wildest, most sporting spot in the world.

Pigsticking always strikes me as the only sport where it is absolutely impossible to 'play to the gallery.' Take polo, what a terrible lot of people do! Hunting is the same, though this is often excusable in the impecunious officer trying to sell! Racing, especially in the paddock before the race, with a nice coat, whip in pocket in approved manner, and a pretty girl! One gets to

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really *know* fellows pigsticking; the chaff and good comradeship mean a lot.

Not the least attractive feature to my mind is the evening shoot after hunting for the pot, geese, duck, snipe, partridges and quail, or if so inclined, blackbuck, parahs, nilghai and muggers. I feel I owe a great debt of gratitude to the gunners. I've been the 'odd man out' in many, as it were, family parties, and never felt it!"

Agra Tent Club.

When "Q" Battery R.F.A. (then 108th) went to Agra in April, 1922, they found that very little had been done by the Tent Club since 1914, and that actually the log showed only 6 pig killed in the last seven years. However the old shikari had been kept on and paid by the club, so it was possible to start hunting at once, and the old logs gave a useful guide as to what covers to hunt and when to hunt them. There was much poaching going on; the villagers encouraging the gipsy tribes to net and kill, with dogs and spears, the pig that were playing havoc with their crops. It was also found that shooting pig by moonlight was a very favourite sport in the Gadpura country, but the railway authorities were sportsmen, and gave the Gunners every assistance when they learned that the Tent Club was once more a going concern. Close co-operation with the territorial sportsmen also taught them how the crime of shooting a hog was viewed from a gunner's point of view. It was soon evident that pig were present in fair numbers, but the jhow and thorn jungle had increased to such an extent that only the best and boldest pigsticker could hope to keep on the tail of a boar in the jhow country, and it was a very difficult performance to spear any but the largest.

The Agra country over which the Tent Club hold their meets is of three varieties.

1. The jhow grass and thorn jungle on either side of the Jumna River for about a distance of 10 miles above and below the city. The actual Kadir country is narrow and patchy, a mile at the widest part, as in many places the banks are high and stony ravine country runs right to the water edge. The ravine country is good pig preserve and requires very careful beating to make pig break out into the Kadir country above or below, or across the river. A good

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many hyena with a few wolves and panther live in this country and take their daily toll of young pig. Local shikaris were encouraged to bring khubber of hyena earths, and as a result several hyena were shot by our gunners sitting up for them at dusk.

2. The canal country, consisting of scrub, thorn and grass on either side of the larger tributaries. This is only huntable in the hot weather when the crops are down, when the pig collect near the water, and the pig when beaten, break out for the bush jungle and thence to neighbouring coverts.

3. The grass country on the borders of Bharatpur State. This is magnificent covert for pig in February and March, but early in April the uncut grass is burnt, and the pig retire into state jungles.

The two incidents that stand out in the memory of those hunting during the season 1923 are described by Major Paynter as follows :—

1. A good boar that died at Jhodpur Jhal.

Spears out, Lieutenant W. B. Wright, J. H. Carroll-Leahy and self. When beating a low ridge half a mile from left bank of canal, a goodish boar was put up in the scrub and headed at once for the canal. He gained his point but not before receiving a light spear from Wright, who with Leahy stuck closely to him and swam the canal in close pursuit. Knowing his point to be down stream, I crossed lower down, and getting between him and his point forced him to lie up under some thick thorny bushes bordering the canal. Dogs and beaters arrived, but he refused to be dislodged, and there was nothing for it but a dismounted attack. Posting Carroll-Leahy above and Wright below, I crawled in on hands and knees and found him in a small nullah with his back against the bank. He did not keep me waiting long, but launched his attack at lightning speed. I had foolishly thought him exhausted. He jinked sharply from the point and alighted on top of me cutting my breeches right across and getting one tush into my right thigh. Of course I went down like a ninepin. Round two was more successful. Wright came in and joined me. We took the initiative and doubled at him in line. He rose too late: my spear got home, though I fancy Wright's was in the floor.

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2. The Jhow Jungle at Tenora.

The first time we hunted this fine stretch of pig cover boar were very numerous but hard to bring to book. In the course of the morning eight good boars were ridden, none accounted for. There were 5 spears out, many tosses and much bad language. Two pig were actually speared lightly, and each of these was killed later on in the season with the old scars plainly visible. The last time I hunted this covert was with Lieut. Carroll-Leahy, and there was quite a different tale to tell. Our Collector had got the local Zemindar to cut all dead jhow and to clear some four acres of thick cover in the centre of the beat. It was in June and very hot. We had some great hunts and killed eight before having to knock off on account of horses.

During the winter 1923-24, 108th Battery was relieved by 42nd Battery, commanded by Major Digby. This year there was a great deal of cut arrah, which lamed at various times over a dozen horses. Arrah is lentil, a common Indian food: The method of cutting it is to slice it upwards leaving from 3″ to 8″ in the ground, with a very sharp point. These stubs vary in thickness up to $\frac{1}{4}$″ in diameter and inflict very deep wounds in the frog and sole of a horse galloping over them. The only case of a cut from a pig occurred on April 27th. A pig was found in jhow near the foot of some cliffs. After being hunted for some time by Peppe and Harding (Somerset L.I.) the pig went up a water track closely followed by Peppe; arriving near the top of the cliff the track became a cul-de-sac, too steep to get round. The pig turned and charged Peppe, who speared, but was unable to prevent the pig from cutting his horse in the stifle. The pig then went under Peppe and broke again into the jhow where he was killed by Harding, Dunn and Dunphie.

The most noticeable traits in the pig are his cuteness and courage. It is marvellous how a pig can suddenly totally disappear in what seems very inadequate cover. One especially good instance of this power occurred one day when we all considered the pig as good as in the bag. Dunphie was on the pig, about a spear's length behind him, Peppe and Digby riding on his left and right respectively. The pig ran into a very narrow strip of not very thick jhow.

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At the end of this strip was a tree under which a coolie was standing. Dunphie took the pig very nearly to the tree and suddenly the pig disappeared and was no more seen. What had happened was, the pig squatted and sneaked back as soon as Dunphie passed him. Spears tried back at once but the pig had been too quick for them.

Instances of courage in the pig were frequent, but the two most outstanding were the following :—

A pig was found in jhow and ridden into a very thick covert of jhow. He was hunted up and down this covert for some time and once charged Digby who was only able to give a very weak spear owing to the heavy jhow. Finally the pig was lost; Dunphie was posted outside to watch, and Peppe and Digby hunted up from end to end. Just as they were completing the beat, Dunphie halloed. He had seen the pig on the bank of the Jumna about half a mile away. All galloped to the river, the pig went down a steep bank into the sandy river bed, spears followed. Then the pig went up the bank and went for whoever dared attack him. The first up the bank was Peppe, and when he got about three quarters of the way up, the pig charged him on his near side. Peppe got a good spear on the near side and then the pig went to the top of the bank and waited for the rest. All got up the bank and the pig charged everyone in turn till he finally died. This pig measured 28½″, weighed 155 pounds and had very fine tushes.

On July 10th some gypsies were beating a large patch of jhow, when the dogs started barking furiously, and news came that they were baying a large pig. Dunphie, Eddowes and Digby were out, and they all went to see what was up. They were not left long in doubt, as when they were approaching the place whence the barking came, out rushed the pig, charging Digby who happened to be nearest. The jhow was too thick for a spear to be used, but the horse just managed to get out of the pig's way in time. A long hunt with the dogs in thick covert followed, the old pig absolutely determined not to break. He was finally hunted into a little clearing; he stood still for a moment behind a jhow bush considering matters, then, spying Digby on his right about 20 yards away, charged straight for him. The horse met the charge most staunchly and a very lucky spear broke the old boar's back, which, of course, completely disabled him. He was a very old boar and completely bald,

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with very fine tushes. Except for the dogs, the spears would never have seen him. The season ended on July 13th owing to the rains. They had 26 meets and killed 44 pig, which was a good performance, as both men and horses were new to the game.

The Delhi Tent Club.

Between the Meerut and Agra countries lies that part of the Jumna Kadir hunted by the Delhi Tent Club. Here conditions are very different: instead of the fortnightly four day distant meets as at Meerut, the Delhi T.C. caters mainly for officers on A.H.Q. staff who are unable to get away during the week, and therefore it meets every Sunday. Most of the meets are within a very short motor run of the city, close to the river. Hunting here is not expensive, and with average luck two horses will suffice to carry one through a season, which starts in December and tails off when headquarters move to Simla in April. Such at least was the experience of my staff officer who has contributed the following account of last season's sport.

"We did not have a very good season last year, owing to the facts that the secretary was unable to hunt much himself and that there was no mounted gunner unit in Delhi. However, thanks to the Commander-in-Chief and his household, we managed to meet most weeks and had some real good gallops. Fortunately also batteries were marching through Delhi during the winter and we were always able to rely on them for spears whenever they were passing. As every hunting season at home recalls itself by the outstanding hunts and the memorable falls one took, so in last season the following two events will not easily be forgotten.

Episode 1. A perfect early morning in January, the sun up but not yet hot enough to bother about. Five spears, two of whom —the doctor and the lad—were out for the first time. A rough and tumble hunt in thick jhow ended in the pig reaching a patch of thick sugar-cane untouched. Followed a series of beats through the cane, with the pig showing himself occasionally but funking the open—coolies apprehensive but doing their job. Suddenly, the ever-welcome 'Wuh jata'—the tally ho of India—and he has broken behind the line. I got away some 200 yards behind him with M., the acting secretary 50 yards behind me, and the rest left well behind.

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Pig led us over some rough country and, when we were nearly on him, gained several lengths by cunningly crossing and then recrossing a deep nullah with slippery, shelving banks. He then rashly turned back to his friendly patch of cane and ran into the rest of the hunt. Followed a mélée in which the pig intercepted three good spears, coolies, and village dogs all mixed up! Three coolies were bowled over by charging horses, and in the confusion the pig reached cover with myself half a yard behind him, and two sporting village dogs yapping at our heels. It was impossible to see in the cane, so hurriedly getting off my horse I threw the reins to the syce and ran in on foot to where the dogs seemed to be baying the pig. M. came in from a different direction but we could not see each other. Suddenly the pig spotted me from where he was crouching and before I could swing my spear round, bowled me over and proceeded to get some of his own back! Coat, breeches and undergarments were ripped open, but I created a lucky diversion by hitting him on the mouth with closed fist. He retaliated by biting through my thumb. I countered by kicking him hard amidships. A lucky blow hit one of the open spear wounds, and with a grunt of pain he left me, very breathless, horribly frightened but with no worse damage than the thumb. This was speedily bound up by the doctor while we got all the spears together for a second onslaught. But meanwhile the lad had quietly gone in alone, and finding the pig held up by the two dogs had slain him—a good show indeed, and he rightly secured the trophy. For many days after this I was watched carefully for signs of rootling for truffles among the office files.

Episode 2. An exodus of the Chief's household had left me in charge. Several hours' heated telephoning overnight to prevent the fair sportswomen of Delhi from joining in a sport which is emphatically not for ladies, had left me very weak. However, arrival at the meet found none of the gentler sex and we formed a long line of 6 spears and some 30 coolies in thick crops just under the celebrated Humayun's Tomb. Almost at once our head shikari kicked up a huge boar between Tommy D. of the 11th and myself. A short fierce hunt followed, each alternately being on the boar. I lost him for a moment and Tommy picked him up: he swung round and charged across an open space straight at me. We

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met, both sides all out, and a lucky spear went right through him pinning him to the ground. I had to let go and dashed off for another weapon while Tommy and the others came up. Even then this gallant boar fought hard, but it was a hopeless struggle. We measured him 35 inches, a long, lean old customer: I reported him as 34½ inches but even then was politely referred to as Ananias Mark II! Such is life!

We reformed the line, and before long another good boar got up, and was hotly pursued by the four spears on the left. I was on the right and it was not my hunt, but I cantered up to watch the fun. This was a right good pig and led them for about a mile through the crops and then reaching a thick patch started charging. When I came up he was standing at bay, had been speared twice but not mortally—in fact seemed more blown than hurt. All four horses were cut, two badly. In response to a shout, I waded in and between us we slew him—first spear went rightly to Tommy D. who had done all the hunting and struck the first blow. This one stood 31½" and weighed over 200 lbs. Of the rest of the day there is nothing to report, but that first hour was one to remember. This season started well with a succession of brigades using the Practice Camp near Delhi. Thanks to "K" Battery, R.H.A., and the 2nd Field Brigade, a good number of spears came out. The Christmas meet was a great success: the Hon. Sec. (a gunner) collected fourteen other gunners who with a subaltern in the Devons and Messrs. Brayne and Sale, the doyens of the Tent Club, made a formidable array. Twenty-seven boar were killed, the most successful day being Christmas Day when eight were speared in the most delightful country. Two of these boar led a heat—the same heat on both occasions—over good galloping grass, but cut up with blind holes and sunken tracks. On both occasions three of the four bit the dust, leaving the fourth man to go on and spear. On another occasion, the day ended with a hunt of ninety minutes after a boar who refused to leave a group of cactus bushes; most of the hunting was done by some of the spears who dismounted and hunted on foot. Eventually this craven pig was brought to bay and after two half-hearted charges, fell a victim to a combined assault of five spears, who spent the rest of the evening digging cactus prickles out of various parts of their anatomy.

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Perhaps the most pleasant features of this meet were that practically every novice got at least one first spear, and that no man or horse was seriously damaged.

There is every prospect of killing sixty pig before the hot weather, and double that number in April, May and June."

Although the Ganges and Jumna Kadir constitute the "shires" of pigsticking, yet good sport is to be had at other gunner stations. The following account from Jhansi, where conditions are very different from those described above, shows that good sport can be had after pig far from the Ganges and Jumna.

Jhansi Pigsticking.

Pig are fairly plentiful at Jhansi, but the ground favours the pig and not the horse. Very good fun is obtainable but bags are not large, 18 to 20 pig being the average for a good year. Major Paynter, R.F.A., first started the Tent Club before the war. Prior to that the country had been considered unrideable. The first season the brigade was here few gunners went out owing to lack of horses. Major E. V. Sarson, R.F.A., hunted in 1921. He had had much experience of similar bad going, having been Secretary of both Mhow and Poona Tent Clubs. He was very helpful in showing novices the way to go. 1923 was the best season since the brigade has been here, and there were some very good days. Gunners have been responsible for twenty first spears since they have been here. This year out of eleven pig killed (a poor year) gunners have accounted for eight.

At Saugor practice camp this year, an impromptu meet ended in Lieut.-Colonel N. P. R. Preeston killing a boar after a good run as follows:—Musters was out one morning with an exercise when his dogs started barking at a bush; he dismounted and found a pig lying up in the bush. He dashed back to camp and raised the only available spears, Lieut.-Colonel Preeston, and Lieuts. Way and Barrington. The pig was induced to break with some difficulty and gave quite a good run.

In March this year the shikari came in with khubber of 3 pig six miles out. Being a polo day it was hard to raise spears. Eventually Capt. Selby, Lieuts. Barrington, Musters and Beecher, all from the gunner mess, went out. They arrived in a car at 3 p.m.

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The shikari took them straight to the bush where he had marked the first pig, syces only were available as beaters. By 3.15 p.m. the first pig was dead after a very fast run, 1st spear to Musters. Horses were given a breather and spears looked for the next boar. He broke very quickly and also gave a good run. 1st spear to Selby. The shikari then said he knew of a third but the horses had had enough. A very quick and inexpensive afternoon's sport. In 1921, Lieut. Bonham, a novice, got a first spear in an unusual way. He was a heavy man and was riding a "hairy." An unwounded pig got into a nullah. Bonham jumped in and tried to bar the pig's way as he broke down the nullah. Bonham received the pig on his spear at the halt. The impact nearly knocked him and his horse over, while the pig was transfixed. Bonham had sore ribs for weeks after from the butt of his spear. In 1923, Musters had a tussle with a wounded sow. The sow had been stuck by the honorary secretary as she had been badly wounded, presumably by a native. She charged and was again heavily speared by the honorary secretary. She then took refuge in a bush and Musters dismounted to finish her off. She charged and Musters received her on his spear. The spear went right through and he could not hold her down. She did her best to bite him and it was not until someone came up on a horse that Musters was able to extricate himself.

The country requires a fast but particularly handy horse. It is, perhaps, only after a season's hunting that a novice realises what kind of bad going a horse is able to gallop over, and only when he has sufficient confidence in his horse to go "all out." It is only by galloping that pig can be caught in Jhansi. There is so much ground advantageous to the pig that the only thing to do is to "bust" him like the divil in the open!

The 14th Field Brigade, freshly out from home, found that the discomforts caused by heat and dust at Hyderabad Sind, were mitigated by good and eventually successful rides after pig. At Mhow and Kirkee, although the going is bad and pig are none too plentiful, there is good sport to be had. At Cawnpore the hunting is excellent, in fact at any of these places the hunting enthusiast coming to this country may safely make pigsticking his first objective

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and expect to enjoy himself. Before the war flourishing tent clubs existed at Roorkee, Bareilly and Fyzabad, and it only needs an enthusiast to resurrect them. From Ambala pig have been killed lately, and even at Ferozepore and Lahore enthusiasts have had an occasional day's sport. Enough has been written here to show that the newcomer to this country who thinks of exchanging his hunting crop for a hogspear has a large choice of stations and a grand sport to learn.

II. Hill Shooting.

For those who contemplate a trip to the hills the experiences of a few officers who have shot there lately will be of interest. Chamba State, which lies between Kashmir and Kulu is not mentioned, but I understand that it still provides good sport. It is easily got at from Dalhousie and in years gone by I made many enjoyable trips through Chamba and over the Drati Pass into Chamba and British Lahoul and on over the Bharra Lachha into Ladakh or Spiti. The Drâti is a ticklish undertaking in June, but one is over and on the Chandra Bargha river in one day and this is its advantage. I preferred this route to Kulu and the Rohtang. Everyone who can should spend at least one leave shooting in the Himalayas. The grand scenery, exhilarating air, and cold climate form a most refreshing contrast to the monotonous stuffy heat of the plains in summer. Big game in the hills may be classified as dangerous and non-dangerous, though the latter are to be found in less accessible places, and their stalking frequently involves considerable risk to life and limb. Some variety of big game is to be found all over the Himalayas, and the further from civilisation one goes, the better will be the sport. The best known, most picturesque, and most expensive locality is Kashmir State: but as Srinagar, the capital, affords a good advanced base for expeditions both far afield and within a few marches, and provides as well fishing, golf, tennis, etc., most married officers, at any rate, choose Kashmir for shooting leave in the hills.

Of dangerous big game, the black and red bear are alone indigenous to the hills; the latter is the more inaccessible as his haunts are just below the snow line, but he is a half-blind, half-deaf, clumsy, timid creature who does not show fight. The black bear

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is, however, a very different creature, who will, in emergency put up a very good show. The pursuit of this animal is a very pleasant way of spending leave, especially for the married man whose wife can enjoy excellent wet fly fishing while he gets thoroughly fit walking and climbing after his quarry. During the leave season April to October black bear may be found wherever there is ripe fruit: in May and June the mulberries will tempt him down to the valleys: in July the apricot and juniper berry, later the walnut and rice. He feeds early and late, usually lying up in the jungle during the day. Though most partial to all kinds of fruit, he is not above killing cattle, whereby he becomes a pest to the local villages and acquires the reputation of a "badmash." If one can get a good shikari, one should be reasonably certain of getting a shot at a bear at least once a fortnight. As he takes a lot of killing, a rifle of not less than 3·75 calibre should be used.

There is great competition every autumn to secure the best nullahs for bara singh, or Kashmir stag in the Liddar valley. The following account by Captain Tawney is typical of the sport to be had there among some of the finest scenery in India. "We camped near Palgam, waiting for the big stags to come in: and at last hoarse bellowing in the night showed us that they had arrived and were challenging each other. About two days later, we saw a fine stag but failed to get within shot; the same evening, however, while returning to camp we heard a clicking noise from behind a rocky spur. Climbing to the top, we came in sight of a steep grassy glade, fringed on the far side by fir trees. In the failing light I saw two stags fighting with locked horns. I fired at the larger one, who fell on his knees, recovered and was just staggering off, when I fired again and finished him. He had quite a good head, the horns being 41½ inches, with twelve points, seven of which were on one horn. Next day before dawn I moved camp and, after about five hours' climbing, arrived above a glade in which some hinds and two smallish stags were feeding; after an hour's wait, a big stag came up bellowing, and drove off the other two. The wind was all wrong for a stalk, so when the stag moved on, we climbed up the hill to keep above him. While climbing we were much embarrassed by the hinds who ran round us snorting, with the inquisitiveness typical of their sex. Eventually we got clear of them and came up with

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the big stag again : two shots in rapid succession at 150 yards, and he rolled past us down the slope. About 200 yards down the hill he got up but another shot sent him staggering into the jungle where we found him lying dead." Although stag shooting does not begin until the autumn, the Liddar valley and Palgam are well worth a visit during the summer, as black bear are numerous, and the route from the main Jhelum valley is easy. Lieut.-Colonel McLeod motored from Poona last spring in a Ford car with a wife and two boys. After halts at Delhi and Kakul on duty he motored on to Srinagar, and after a fortnight on a house-boat spent a fortnight in the Liddar valley near Palgam. His account is as follows :—

"I can strongly recommend anyone to make for Palgam early and have a base camp there. It is a lovely spot and some beautiful expeditions can be made up both the upper branches of the Liddar valley. There is a good old shikari at Palgam who knows all the best places for bears. He is well worth his pay as he runs all the transport and camp pitching arrangements. Ponies and coolies are easily obtained. The latter are cheery, hefty fellows who are quite content with their day's pay. There are plenty of black bears within a few miles of Palgam and one gets good exercise going after them on the mountain sides in the early mornings and evenings. The red bear are mostly found up the Aro valley beyond Liddarwat and on the snows of Kalahoi. Black bear are found almost everywhere and they sometimes come right down into the valleys at night to feed. The easiest way to shoot a black bear is to sit over a panther's kill (these are pretty common). The bears nearly always find the meat and come back to it every night till it is finished. I got my bear over a pony which had been killed by a panther. A bear had had a good feed off it the night it was killed and I got him coming back the second night about 7.30 p.m. He was a good big bear with a fine coat, but without the white collar." The non-dangerous, and therefore timid, game have receded before the influx of white sportsmen into Kashmir, who have now to march into Ladakh, Baltistan, Kishtwar or Wardwan to get their trophies: Tibetan antelope, ovis ammon, shahpu, burhel and ibex in the two former provinces, and ibex, thar and gooral in the latter. Only the big stag, barasingh, and an occasional serow are still to be found in Kashmir proper.

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The following extracts from an account of a shooting trip in Ladakh by W. J. Cooper give a good idea of the sport to be had, given the time, and the willingness to rough it. "Three months should be allowed for a trip to Ladakh, and of this period half will be spent in marching, leaving only six weeks for shooting and rests. The period which involves the hardest marching (the outward journey is almost entirely over snow) is from March to June, but during this time the game is considerably lower and therefore easier to reach, it is also less disturbed and less wary. Eight persons are allowed to shoot in Ladakh each year, and in order to get a choice of blocks, one should reach Srinagar by March 25th. Of these blocks those on the upper Indus are considered the best, game being more plentiful and the climate less severe. After a fortnights' march I reached Khalsi on the Indus, and halted to try for shahpu which were then to be found much lower down than later in the season. The hills here rise two or three thousand feet above the river and consist of weathered shale which does not make for easy climbing. Chaplies with bottoms of crepe rubber proved the best footwear, as there was very little snow. There were a fair number of shahpu about and they kept to the tops of the hills. My usual procedure was to climb the first likely hill, and have a good look round, and then start a stalk if conditions were favourable. At the end of a stalk lasting over two hours I got a shot at the largest ram of a herd of six: he was sitting on the edge of a ledge and appeared to crumple up before he fell off. Assuming that he was dead, I turned my attention to the rest of the herd in the hope of getting another shot. After a couple of minutes we went to look over the ledge and found that the shahpu had struggled to his feet and was making off down hill. He was too far off for a shot, so I gave chase and although the unfortunate animal had both his hind legs broken by my shot, he managed to struggle on for nearly a mile before I could get up and give the *coup-de-grâce*: a most regrettable incident.

I tried to get another shahpu without success, and then moved on to the Ammon country. My first day I started off at half-past seven, and after a tiring climb saw five ammon, some resting and others feeding: they had taken up a sound strategical position and approach was almost impossible. After a three hours' wait the

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situation had not improved, so slowly, painfully, and with the greatest caution my shikari and I crept from rock to rock down the forward slope and managed to get within 250 yards; I fired at the largest, hit him in the forehand, fired again and brought him to a standstill. The herd, curiously enough, did not make off until after my second shot. During the next few days I shot a small burhel, missed another, and bagged a good ammon. I then moved into Upper Ladakh for Tibetan antelope. As the average elevation of this part is 16,000 feet, I decided to bag my antelope with all speed. They were very plentiful and I had no difficulty in getting three. These animals are cream-coloured with black legs, with a marked puffy appearance about the muzzle. Before leaving India I was lucky enough to get a forty-three inch ibex: the only possible way for a stalk was direct from a spot right beneath him, and this proved such a noisy procedure that I nearly abandoned the attempt. However, just as I came in view and range, he walked to the edge of the khud to see what the noise was about and fell an easy victim."

A shooting trip to Kulu.

"The Kulu Valley, at the northern end of which is the Rohtang Pass leading to Lahoul (15,000 feet) and also the source of the River Beas, has a climate very similar to that of England, and is renowned for its fruit, some half dozen British families making their living out of fruit growing. It is probably one of the easiest places in which a novice can make his first hill shooting expedition. There are bungalows along the whole valley, any one of which can be used as one's headquarters and one is never more than two day's march from a post office. The number of big game licences (costing Rs20) issued annually are limited and are always fully taken up, one has therefore to apply early to have any hope of obtaining a licence. The big game obtainable in Kulu are:—Red and black bear, panther, tahr, ibex, and gooral, and in the winter burhel may be found in the northern end of the valley. The ibex as a rule, have small heads only, and if one wishes to obtain a really good specimen, one must continue one's journey into Lahoul, which is a very barren country. Good tahr and gooral can be obtained. They are all found on steep grassy slopes, gooral at altitudes between 6000 and 8000 feet, tahr from 8000 feet to the snow line, and the ibex on the

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snow line and above. The tahr and gooral as a general rule lie up during the day and come out to feed in the morning before the sun is up and in the evening as soon as the sun has gone down. Ibex can be met with at any time. They all have very keen sight and really one's only chance is to climb above them and then to work down on top of them. One is more likely to find tahr and ibex in the Northern end of the Kulu valley, where there are two peaks of over 20,000 feet, and, of the nullahs which emanate from the main valley in this part, the Solang and the Hamta are recognised to be the best. Gooral are found lower down the valley, and the slopes above Kheat probably gave one the best chance of obtaining a specimen.

During my expedition I got on to the track of ibex three times. On the first occasion we spotted what appeared to be a very good head, about 1500 feet above us, at about 2 p.m. one afternoon. The ibex had also obviously spotted us; we allowed him to get out of sight and then started to climb in pursuit. By dint of much pulling and pushing on the part of my shikari and a Gurkha orderly we got up to the spot where we had last seen the ibex. As might be expected he was nowhere to be seen; we scrambled round the shoulder of the hill and eventually saw him again about the same distance away as when we had first spotted him. I had only been in Kulu about a week and was not properly acclimatised to the heights. The altitude was, as far as could be judged about 15,000 feet, and I felt very seedy with what I presume was a touch of mountain sickness. Accordingly after a short rest we postponed the chase and wended our way back to camp. The next day we started early, intending to get up to the spot where we had last seen the ibex, taking a different route. On the way we came upon three ibex, one of which appeared to have a fair head. We got up to within about 200 yards. I fired three shots without result. It was impossible to follow them up as the ground was absolutely impassable, and so we returned to camp. We moved camp shortly afterwards and in the afternoon I sent out my camp coolies in different directions to look for signs of ibex. One came back at dusk and reported that he had seen a herd of about fifteen. We made plans for a very early start the next day and left camp just before dawn (about 4.30 a.m.). We reached the place from which the herd had been seen about

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mid-day, but there were no signs of them, and so after a short rest and some lunch we went up still higher. At about 1.30 p.m. I was feeling rather done having been on the move the whole day, and almost made up my mind not to go any further. I sat down therefore and waited, sending the others on to the top of the ridge, about five hundred feet higher up, to see if they could see any signs of the ibex on the other side of the ridge. I had not waited very long before one of them came back greatly excited saying that the herd was on the other side of the ridge and about 1500 feet below it. This made a great difference to my feelings and it was not very long before I was on the top of the ridge, and sure enough the ibex were still there, and quite unsuspecting our presence. These were about twenty. The descent was fairly easy except at one place where we had to cut steps in an overhanging snow cornice, and we managed to get down to within 100 yards of the herd without disturbing them. I shot two, one head measuring 39 inches, which is quite a good head for Kulu. We got back to camp as it was getting dark, weary, but thoroughly pleased with the results of the day.

In my very short experience tahr appear to inhabit far more inaccessible places than ibex, but perhaps I was abnormally lucky with the latter. On one occasion I sat for three days with my feet over a precipice watching three very good tahr grazing about 1000 feet below me hoping that they would eventually work their way up within range. They did not do so, and my shikari informed me that there was no possible way of getting down to them. I was sitting in camp one afternoon, the weather was very wet, when I suddenly saw six animals grazing a long way off. There was much speculation as to what they were, but there were no means of telling whether they were tahr, ibex or burhel. The shikari said they were too high for tahr, they did not look like ibex, and so I hoped that they might turn out to be burhel. We started off at 4.30 a.m. the next morning, prepared for a very long day. On the way we twice came to impassable places and had to retrace our steps, and it was not until 2.30 p.m that we came within sight of the animals and found they were tahr. They were grazing on a precipice and there was a deep ravine between us. They were at least 350 yards away. The hill side was so steep that they could only move at a walk. I was determined not to go home without having a shot,

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and at the seventh shot one crashed into the ravine below. Unfortunately we found that its head was smashed when we got down, and only one horn could be found. It was a great disappointment as it would have been a very fine head of 13 inches. The worst of the day, i.e., the journey back to camp, was still before us. It was freezing hard and bitterly cold. By the help of the coolies who came out to meet us with hurricane lanterns we eventually got back to camp at midnight.

Grass shoes, which are made locally, are invaluable for getting about in rocky places, but the feet get very wet and cold. They can be obtained from the Lambardar of Plach, a small village at the southern end of the Kulu valley, for about one rupee a pair. Gooral shooting is much easier going, and there is really nothing to be said about it. I found that one could always get two shots at a gooral, as if the first shot is a miss the gooral invariably seem to go on for about fifty yards then stands for a couple of seconds to look round."

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AN INEXPENSIVE FISHING TRIP IN INDIA.

By Captain A. Veitch, R.A.

VERY few officers of the Royal Artillery seem to be aware that most excellent trout fishing is to be obtained in Kulu, so a short account of the place and means of approach may not come amiss to readers of the Journal. The district of Kulu lies about 120 miles north of Simla and varies in height from 3000 feet to 20,000 feet. The River Beas rises near the Rotang Pass and runs through Kulu from north to south, and it is this valley which is the main habitable portion of the country and where the best fishing is to be obtained. It can be approached from Simla or from Pathankot.

From Simla via—(a) Narkanda, or (b) Mandi.
From Pathankot via—(a) Dulchi Pass. (Winter route.)
(b) Babi Pass. (Summer route.)

For those whose leave is short the route from Pathankot is undoubtedly the best as from this place motor transport can be obtained to a point quite close to the two passes, from whence it is only three marches to Sultanpur (or Kulu as it is now known), the capital of the district. For those who can afford the time and enjoy marching, the route from Simla via Narkanda is strongly recommended. It is mountainous but the road is good and the scenery magnificent. The route via Mandi is said to be very pleasant during the cold season, and Kulu is always approachable this way as no high passes have to be traversed, which may be blocked by snow.

If a start is made before May and the Narkanda route be chosen, enquiries should be made to the Naib Tehsildar at Banjar as to whether the Jalorie Pass is passable by pack animals or not. The writer this year, trusting to a guide book which stated that the pass was usually open by March 15th found on April 15th six feet of snow in places on the road on the northern slopes, whilst the southern slopes which had been in view for days gave no indication of this. He had great difficulty in getting his transport across.

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No matter which route is chosen, sooner or later pack transport is the only possible way of carrying kit and this should be borne in mind when starting.

Fishing is open in Kulu from 15th March to 15th September, the cost of a license, obtainable from the Assistant Commissioner, Kulu, being as follows:—

For the season	Rs50
,, 1 month	Rs20
,, 10 days	Rs8

120 fish exceeding 9 inches are allowed to be taken out per month for each license. A portion of the rivers Beas and Tirthan, the latter joining the Beas at Largi, have been stocked with brown trout. The writer did not fish the Tirthan river at all but saw plenty of fish in the stream, and imagines it would be very difficult to fish owing to the extreme clearness of the water. The best fishing on the Beas is to be obtained between Nagar and Kulu, a stretch of some 18 miles, and there is one excellent pool below Kulu, a mile or two above Bajoura. The stream is stocked with trout from hatcheries near Nagar, and is kept stocked by yearly additions, the fish also are breeding naturally as well. The best pools are all situated near Katrain where the river is broken up by several islands. The bungalow at this place is ideally placed from a fisherman's point of view, as it is situated right in the middle of the best fishing. Another very good spot is a pool 1 mile south of Raisen Bagh, here a tent is to be recommended as the nearest bungalow is at Katrain some five miles away. Another good pool is at the 4th milestone above Kulu; good fishing is also to be obtained in the many side nullahs. The fish average 12 inches in length and are in very good condition. The record fish was caught this year and weighed 5½ lbs. This was captured by an angler on whose licence no limit of numbers had been stated, and who took out over 1000 trout in 5 weeks' fishing! The writer obtained 54 in 17 days, 28 of them being over 1 lb. in weight, for his best day he caught 11 fish in 2½ hours, 8 being between 1 and 2 lbs.

Good mahseer fishing (though the fish do not run very large) is to be obtained in the Beas near Largi. The Beas is full of barbel

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which run up to 4 or 5 lbs. in weight. They seldom take a fly or a spoon, although they have been caught in this way, but will provide good sport with a worm when the river is too coloured for fly fishing. Trout may also be fished for in this way when all other methods fail, and one angler this year obtained 8 good trout by this means in the middle of the rains. Fishing is at its best soon after the opening of the season until the middle of May after which the melted snows and the rains render the water absolutely black and fly fishing becomes impossible in the main stream, but even this may sometimes be obtained in the side nullahs. The water clears again after the rains and good sport can again be got till the close of the season on September 15th. All the streams have a very swift flow and dry fly fishing is out of the question but the fish take a wet fly freely. The following flies are recommended :—

(a) *Salmon flies:* Silver Doctor, Butcher, Thunder and Lightning, Jock Scott.

(b) *Trout flies:* Gold March Brown, Butcher, Zulu, Teal and Red, Grouse and Claret, Grouse and Orange, Greenwell, Heckam Peckam, Cochibondu, Alder.

Sizes 5, 6 ant 7 seem to be the sizes the fish prefer. Often when fish will not look at a fly they will take a spoon and of several types of spoon tried a $1\frac{1}{2}$ inch aluminium spoon with a single hook proved most successful. The writer tried spoons with treble hooks but for some unknown reason the fish nearly always got off. The fish will not look at a spoon under 1 inch in length. Phantom minnows also proved a success but undoubtedly, in the writer's opinion, the best spinning bait would have been dead bait. Small fish for this form of fishing are very difficult to come by in Kulu, and anybody wishing to fish by this means should bring with him the pickled variety.

A 9 foot 6 inch or a 10 foot trout fly rod is all that is absolutely necessary, but a 14 foot mahseer spinning rod with a fly top as well is a useful addition. The lighter rod will generally cover all the water if used with a fairly heavy line, but at times a longer rod for fly fishing is an undoubted advantage. For spinning the larger rod is necessary as many of the pools are of considerable breadth and the water could not be covered without a powerful rod. Reels should be large enough to carry at least 100 yards of line as there

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are many big fish in the river and, in places, fish must be allowed to take out plenty of line owing to the rocky nature of the banks which makes the following of a fish a very slow business.

Traces and casts should be stout, medium trout and even light salmon not being to strong. The fish are not at all gut shy and owing to the swift current strong gut is needed for even small fish. The river is also full of snags and with fine tackle disaster from this is inevitable. Waders are useful but not a necessity. Plenty of fishing is to be obtained from the banks and wading is a dangerous pastime in such a rapid stream, the bed of which is also full of large boulders and holes, but to reach some of the best pools the river has to be waded, as bridges are few and far between. For those who like to keep dry they are a useful adjunct, but to reach these pools it is generally only necessary to wade knee deep. Only the roughest of kit need be taken, two or three pairs of strong boots are necessary and a warm suit and underclothes should not be forgotten as the weather can be very cold indeed. An 80 lb. tent is recommended, for although there are comfortable dak bungalows at all stages they are on an average 12 miles apart. It is impossible to fish the river thoroughly relying on bungalows; also if any other traveller requires your room after 72 hours' stay you have to clear out.

From reading the official pamphlet or rules one would be inclined to think that great difficulty would be experienced in obtaining supplies or a room in the bungalows after 48 hours' stay. This is not the case, supplies can be quite easily obtained, although you may have to pay a little more than the government rate, and after 72 hours' stay in a bungalow double rate is charged. The writer on two or three occasions was able to stay in dak bungalows from 10 to 14 days without being turned out. The writer did himself very well with a bearer and an Indian orderly. The former was a good cook and so no khansama was necessary but a bearer who can cook is a necessity as very few bungalows have a khansama and those that have should not be employed as their charges are excessive. A coolie for general work and water duties can be hired in the country for 6 annas a day.

Avoid as far as possible engaging transport in Simla where the cost of hire per mule is Rs2 per stage, R1 for every day's halt, and

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12 annas per stage for the return journey. Try and obtain transport from Kulu as early as possible. The above prices will have to be paid for all marches in the Simla Hill States, but once out of these the charges are Rs1/4 per mule per day, 10 annas for each day's halt and no charge is made for the return journey. Grass, milk, grain, eggs and chickens can be obtained at all stages and also supplies for servants. Once out of the Simla Hill States these are quite cheap. Beef cannot be obtained anywhere. Mutton, if a whole sheep is bought, can be obtained at most places if two days' notice is given to the Takhildar of the village. At Bajoura, Kulu, Katrain, Nagar and Manali there are butchers from whom joints can be bought. Bread also can be obtained in Kulu and Katrain. No European stores can be obtained anywhere, and any tinned articles which may be wanted must be imported by the traveller. The best way of obtaining butter is to arrange with Kaventer's in Simla to despatch supplies as required. V.P.P.

The total cost of a two months' trip to this delightful valley was Rs700 and was quite the most enjoyable and least expensive leave the writer has ever experienced. Kulu has attractions other than fishing. Panther and black bear may be shot in the valley, whilst on the hills, brown bear and ibex are to be obtained. In the autumn the best phesant shooting in India is to be had here and in the winter woodcock abound. The scenery is magnificent and should be a paradise for a landscape artist.

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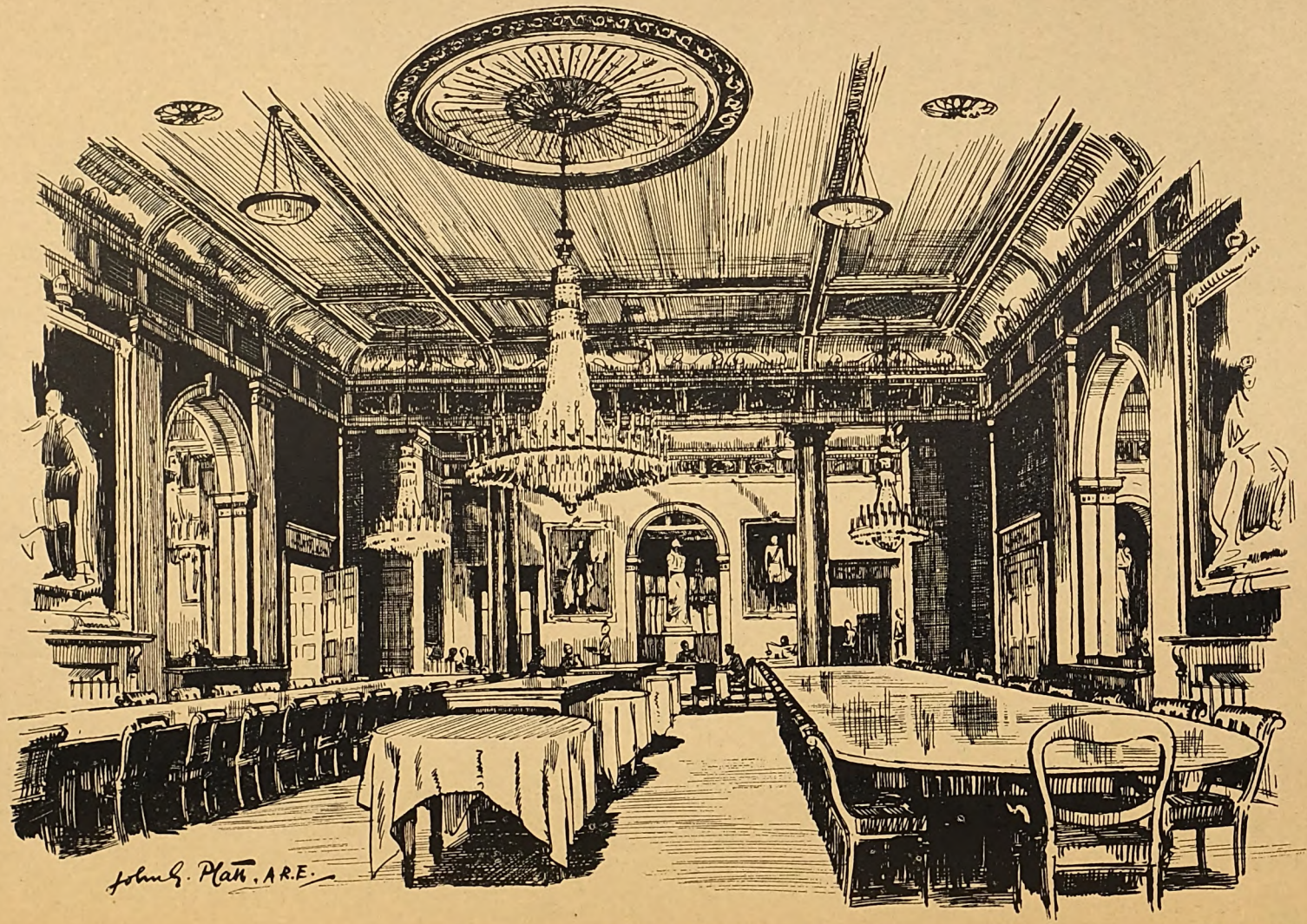

THE DINING ROOM, R.A. MESS, WOOLWICH.

[See p. 305.

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XLI R.F.A.

WEDNESDAY, 11th NOVEMBER, 1914.

WITH TWO MAPS.

BY MAJOR A. F. BECKE, LATE R.F.A.

" . . . Their shoulders held the sky suspended;
They stood, and earth's foundations stay . . ."

A. E. Housman.

NOTE.—This account is based on the following War Diaries:—2nd Division, R.A.; XLI Brigade, R.F.A.; 9th, 16th and 17th Batteries; 35th Heavy Battery; 5th Field Company, R.E.; 1/Black Watch, and 2/Oxfordshire & Buckinghamshire L.I. The account of the 5th Field Company, R.E., however, is based primarily on an article and a sketch published in the R.E. Journal, October, 1919 (pp. 179-182), which itself is an extract from the report of the C.R.E., 2nd Division. A published statement of an officer of the 9th Battery has also been used. In addition the information, obtained from the sources quoted above, has been supplemented by statements made by officers of the XLI Brigade Staff; of the 9th, 16th and 17th Batteries; of the XXXIX Brigade Staff, and by the battalion commander of the 2/Oxfordshire & Buckinghamshire L.I. Without the help given by these officers it would have been impossible to have cleared up the situation and compiled this account.

The maps are compiled from the same sources, supplemented by sketches given in the G.S. Diaries of the 1st and 2nd Divisions, in the Diary of the C.R.A., 2nd Division, in the Narrative of the 5th Field Company, R.E., and those in *Ypres, 1914* (the German official account of the battle). The background of the map is part of

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sheet 28 N.E.3 (Gheluvelt), 1/10,000, Edition 8.[1] It must be noted that the arrangement of the squares in 1914 was different from that shown on this background map. In the Diary of the C.R.A., 2nd Division, for November 1914, there are 1/40,000 tracings which show the squaring in force at that time.

PART I.

Dawn—Noon, 11th November 1914.

On Wednesday morning, 11th November 1914, the situation on the British Front from the Menin road to Broodseinde (2¼ miles north-east of Westhoek) was broadly as follows:—This section of the line, about 3 miles long, was held by three attenuated infantry brigades. The 1st (Guards) Brigade (1st Division), commanded by Brig.-Genl. C. FitzClarence, VC, now reduced to about 800 bayonets, held a front of about 1100 yards from just north of the Menin road to the south-west corner of Polygon Wood. From this point two brigades of the 2nd Division held the remainder of the line which, at first, ran along the south side of the wood,[2] and then, curving round the eastern edge, ran in a north-easterly direction until its left joined with the right of the French IX Corps near Broodseinde.

About four hundred yards from the south-western corner of Polygon Wood there was a small strong point, sited behind the thick hedges of the garden of a ruined cottage. This strong point was garrisoned by C. Company, 1/Black Watch, now reduced to about 40 men, and commanded by Lieut. F. Anderson.[3]

The battalions holding the line were exhausted by the numerous heavy attacks to which they had been subjected since they had

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[1] In the large scale maps the editions of the topographical detail (apart from the trenches) were known by numbers, and editions of the trenches by a letter. Thus Edition 8B meant the 8th edition of the outline and the second edition of the trenches issued with that outline edition. *(Report on the Survey on the Western Front, 1914-1918, p. 76.)*

[2] The 1/King's, who held the southern edge of Polygon Wood, were only about 450 strong on the 11th November.

[3] A rough plan of this strong point is given in Appendix 1. Its position on the map has been fixed from information supplied by Lieut. (now Major) F. Anderson, D.S.O., M.C., (late) The Black Watch.

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reached the Ypres front three weeks before, as well as by the continuous strain of being in close contact with a numerous and active enemy during the whole period. The British units were all far below their war establishments, they were all short of officers, and many were trying to assimilate the reinforcing drafts that had reached them during the battle. As for reserves, in the proper sense of the word, there were none behind the British front. Bivouacking in the woods and fields in the battle area there were a few of the more sorely tried battalions, who had been pulled out to obtain a night's rest. In the event of any pressing need it was these units alone that could be used to push forward into any gap that might be punched in the thin front line.

The trenches too were very different from the trench lines of the later periods. At Ypres in 1914 the trenches were not continuous, further, they were very shallow, merely giving cover kneeling, and they were gradually getting waterlogged.

On the other hand, on the German side it had been determined to bring matters to a crisis in front of Ypres. To achieve this end Plettenberg's Corps, composed of Winkler's *Composite Guard Division*[1] and the *4th Division*, each 12 battalions strong, had been brought up and inserted in the front line between the *XXVII Reserve Corps* on the north and the *XV Corps* on the south, that is between the German *Fourth* and *Sixth Armies*. The corps was to attack astride the Menin road, break through the exhausted British line, and achieve the long-sought victory by one tremendous hammer-blow. The critical hour had come.

On that Wednesday morning the three batteries of the XLI Brigade, R.F.A., were in action to the east of Westhoek. Although actually behind the 1st (Guards) Brigade, of the 1st Division, the three batteries formed part of the 2nd Divisional Artillery, and their task was to cover the ground in front of the right of the 2nd Division.

The Order of Battle of XLI R.F.A., on this day was as follows :—

[1] It was the *1st Guard Division* with the *4th Guard Infantry Brigade* in place of the *2nd Guard Infantry Brigade*, which was in the line near Arras.

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Brigade Commander ... Lieut.-Colonel S. Lushington, C.M.G.
Adjutant ... ... Captain G. St. L. Thornton.[1]
Orderly Officer ... Lieut. O. M. Lund.
Medical Officer ... Lieut. R. Ellis, R.A.M.C.[2]
Veterinary Officer ... Lieut. G. Williamson, A.V.C.

9th Battery[3] ... ... (6, 18-pr. Q.F.)
Major H. C. Rochfort-Boyd.[4] 2/Lieut. H. Lowe.
Captain H. G. Lee Warner. ———[5]
Lieut. A. L. P. Griffith.

16th Battery[3] ... ... (6, 18-pr. Q.F.)
Major W. E. Clark.[6] Lieut. H. O. C. Anne.
Captain C. R. B. Carrington. 2/Lieut. G. Messervy.[8]
Lieut. S. Atkinson.[7]

17th Battery[3] ... ... (6, 18-pr. Q.F.)
Major H. H. Bond.[9] Captain D. C. Stephenson.[10]
Captain H. H. Joll. 2/Lieut. R. T. W. Glynn.
Captain C. T. Carfrae.[10]

[1] Captain F. Brousson was wounded on 21st October 1914, and Captain Thornton took over on 26th October 1914.
Major G. St.L. Thornton, D.S.O., died on 4th February 1918.

[2] Lieut. Ellis was appointed to the XLI Brigade, R.F.A., on the 9th November 1914, vice Lieut. F. O. L. Moore who was transferred to the Connaught Rangers (war diary A.D.M.S. 2nd Division). The war diary of the 2/Connaught Rangers states that Lieut. Moore joined that battalion on 9th November. Lieut. Ellis actually relieved Lieut. Moore on the night of the 8th November. He then remained with the XLI until August 1915, and stayed with the 2nd Division until the end of the war. Lieut. Moore returned to Westhoek on the afternoon of 11th November to assist Lieut. Ellis. Further help was also given on the 11th by Lieut. Hardy, R.A.M.C., the Medical Officer of the 2/Oxfordshire and Buckinghamshire L.I.

[3] A brief record of the previous designations and services of the Battery is given in Appendix 2.

[4] T./Lieut.-Colonel H. C. Rochfort-Boyd, D.S.O., died of wounds on 4th December 1917.

[5] 2/Lieut. J. D. H. Farmer, 9th Battery, was killed on 4th November 1914, by a heavy howitzer shell that burst in the battery; it also wounded another officer and the Battery Serjeant-Major.

[6] Major H. F. E. Lewin was wounded on 23rd October, 1914, and Major Clark took over command on 6th November 1914.

[7] Captain (Acting Major) S. Atkinson, M.C., died on 7th February 1918.

[8] Captain (Acting Major) G. Messervy, M.C., was killed in action near Rumilly on 8th October 1918, whilst in command of the 16th Battery. He had served throughout the war in the same battery, succeeding to the command of it in July 1916.

[9] Colonel H. H. Bond, D.S.O., died in Dublin on 10th November 1919.

[10] News that Lieuts. C. T. Carfrae and D. C. Stephenson had been promoted to Captain reached the 17th Battery on 8th November 1914. Both officers were still serving with the battery on 11th November. Major D. C. Stephenson, D.S.O., was killed in action on 23rd March 1918.

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The headquarters and three batteries were all situated in the vicinity of Westhoek. The Brigade headquarters itself was in a splinter-proof dug-out at the side of the Chapel to the south of the cross roads. Lying on comparatively high ground, it was visible to the Germans during the whole time that they were in occupation of the Nonne Bosschen, and everyone who visited it was sniped at. The Brigade dressing station was situated at the corner of the cross roads in Westhoek; whilst the Brigade office, with the Adjutant, was placed in a building about twenty yards away along the Zonnebeke road. The XLI Brigade was connected by telephone both with the C.R.A., 2nd Division, and with the 5th Infantry Brigade headquarters (Colonel C. B. Westmacott), the latter being in a house close to the north-west corner of Polygon Wood.[1]

The 9th Battery's position was along a fence that formed the southern boundary of the garden of a small two-roomed cottage. To screen the guns, big branches of trees had been cut down and planted vertically along the fence, thus giving to it the appearance of a small belt of saplings. From the front only the gun muzzles were visible, and even they could only be seen with difficulty. To permit, however, of extreme traverse it sometimes became necessary to uproot one or two of the branches. In order to give protection to the detachments, narrow slits had been dug behind the wagons, and an extra slit served as a command post.

The guns of the 16th Battery were in action in a grass field, along a wire fence under some apple trees.[2] A gunner climbed into one of these trees during the morning of the fight, and from this point of vantage reported the German progress through the Nonne Bosschen (Nun's Copse) until he was ordered down by the battery commander. Overhead, to hide the guns from hostile aeroplanes, the apple-tree screen had been strengthened with extra branches. The fence on the left flank of the guns was a plain wire one with a few scattered bushes in it. The guns themselves were slightly sunk, and deep slits for the detachments had been dug alongside them. The casualties in the battery were undoubtedly kept down by the detachments being rigidly confined to these slits, except when

[1] These lines are shown on a sketch of telephone communications on the 10th November, which is an appendix to the diary of the C.R.A., 2nd Division.

[2] From right to left the subsections were A, B, C, D, E, & F.

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they were actually engaged in serving the guns or in replenishing the ammunition. The field immediately in front of the battery contained a very strong growing root-crop. Then about thirty yards in front of the guns the ground dropped out of sight into a depression which fell from south-west to north-east. Away to the left (or north-eastern) flank the view gradually opened out and the trees of Polygon Wood could be seen about a thousand yards away. In front of the battery the ground gradually rose again into view towards the Nonne Bosschen; but, with the exception of the south-western side, the edges of the wood were not visible from the battery, and, in particular, the northern tongue of the wood was in dead ground, so far as the 16th was concerned. The bulk of the wood itself, however, lay on rising ground, and, as the trees composing it were large and there was little undergrowth, it could easily be seen into.

The 17th Battery was in action just behind a line of willows, but a wooden barn, on its right front, partly masked the battery from the Nonne Bosschen.[1] The battery faced south-east, it was covering the trenches about Reutelbeek.

At this period of the war it was the custom at night time for the detachments to be withdrawn to billets, in houses or barns, close to the battery; whilst guards, with sentries posted, were left in charge of the guns.

There are two other units whose locations should also be briefly described. On the right of the 16th and south of Westhoek, a French 75$^{m/m}$ battery was in action behind a bend in the road that led towards Clapham Junction. This battery had Gheluvelt as about the centre of its normal zone. The French guns were in action all day, and a British battery commander described their detachments as "*pleins de sang-froid.*" The French battery commander was always quite undisturbed by the close proximity of the German infantry; but late in the afternoon he did protest very energetically when he was shelled by one of the British batteries, in action away to the north.

The headquarters of Lieut.-Colonel G. G. S. Carey, commanding the XXXIX Brigade, R.F.A. (1st Division), the brigade on the

[1] It was the same building that 2/Lieut. Glynn's party occupied later in the day. (See p. 164).

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right of the XLI, were situated at the end of a sunken lane, that traversed Glencorse Wood, and immediately north of General FitzClarence's headquarters. With Colonel Carey were his adjutant, Captain A. K. G. White, and orderly officer, Lieut. P. H. Murray, together with mounted orderlies and headquarter men. The horses of the party were in the sunken lane. This position was maintained all day, and actually Colonel Carey did not move his headquarters from it until the 13th November.

Before daylight on the fateful 11th November, Major W. E. Clark and Captain C. R. B. Carrington of the 16th Battery, together with 3 signallers, reached the Battery O.P., situated about 150 yards behind the front line of the 1st (Guards) Brigade. The O.P. was a deep narrow slit, dug in the north side of a hedgerow, and placed on the forward slope looking out towards Gheluvelt, two thousand yards away. At about the same time Major H. C. Rochfort-Boyd, of the 9th Battery, moved forward alone from his O.P., so as to make a personal reconnaissance from the infantry front line. He proceeded to a trench in the front line which he often used, near the ruins of Lone House, in which the battalion headquarters of both the 1/Cameron Highlanders and the 1/Black Watch were located. The O.P. of the 17th was in the firing line of the 1/King's (2nd Division), and on this day Captain C. T. Carfrae was acting as observing officer for his battery.[1]

Day broke grey and very misty, and visibility was poor.[2] About 6.30 a.m. were noticed the first signs of the coming storm, for at this hour the German artillery opened fire. The bombardment, by field guns, supplemented by 5·9″ and 8″ mortars, started gradually, and very slowly it worked up to its greatest fury.[3] Whilst at its height it was undoubtedly the most severe yet experienced in the war. It was not long before the telephone wires, connecting the O.P's with their batteries, were blown to pieces and

[1] On the 6th November, B gun, 17th Battery, was brought into action in the King's front line alongside the Battery O.P., and it was used for dealing with German snipers; the gun was withdrawn on the 9th November.

[2] It was misty until about noon with a light wind blowing towards the enemy, then the wind increased and dispersed the mist; but soon afterwards it began to rain, and by nightfall it was pouring.

[3] The German artillery orders were that their batteries should open fire at 6.30 a.m., and that the bombardment should work up to its greatest intensity between 8 and 9 a.m. The infantry assault of Plettenberg's Corps was to be delivered at 9 a.m.

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communication with the rear became impossible.[1] Two signallers (Corporals Richardson and Cook)[2] went out alternately from Major Clark's O.P. to restore the line back to the battery. They stayed out all through the bombardment, endeavouring to mend the line. The shelling, however, was too heavy, and the line was broken far more quickly than it could be repaired. Consequently communication was never restored between the battery and its O.P.

About 8 a.m. the bombardment became intense and at the same time it spread to the rear. A heavy fire, shrapnel combined with H.E., was now opened on Westhoek and the batteries in its vicinity.[3] The telephone wires were constantly cut and all messages had to be taken by orderly.

At about 8.30 a.m., the C.R.A. of the 2nd Division (Brig.-Genl. E. M. Perceval) was riding towards the XXXIV Brigade, R.F.A. (22nd, 50th, and 70th Batteries), which was in action about ¾ mile north-east of Westhoek, when he noticed that Westhoek itself was being severely shelled. This unusual activity caused him to return to his headquarters at White Farm[4] to ascertain what was happening. By 10 a.m. the report reached him that the enemy were in the Nonne Bosschen.

To return to what was happening in the front line. As time wore on the officers up in the 16th Battery O.P., with their tele-

[1] In 1914, the O.P's were connected to their batteries by single telephone lines, and at this time all lines were open wire routes. Buried cables did not come into use until the spring of 1915.

Colonel Carey's telephone wires were also all cut by the bombardment, and thereafter messages were taken to his batteries (46th, 51st, and 54th) by mounted orderly. Except for occasional sniping, movement east and west through Glencorse Wood was almost undisturbed on the 11th, and by using this covered approach Colonel Carey kept in touch all day with his batteries. Colonel Carey was also in close touch all day with the 1st (Guards) Brigade headquarters.

[2] In March, 1917, Corporal T. W. Richardson, D.C.M., was given a commission. He was killed in action as 2/Lieut. T. W. Richardson, M.C., D.C.M., R.F.A., on the 28th March, 1918.

By March, 1916, Corporal V. G. Cook, D.C.M., had been promoted to be Battery-Sergeant-Major whilst still serving in the 16th Battery, and he remained with this battery until August, 1919. He gained a bar to his D.C.M., in September, 1918. It is a pleasure to be able to record that in February, 1924, B.S.M. Cook, D.C.M., rejoined the 16th Battery.

[3] Until about 3 p.m., Westhoek and the area around was intermittently subjected to shell fire of varying intensity. Up to the time when the German assault was launched this shelling had had no effect on the batteries of the XLI Brigade.

[4] On the Ypres-Zonnebeke Road ¾ mile east of Potijze and rather more than 1½ miles west-north-west of Westhoek. The day headquarters of the 2nd Division were also at White Farm, but at night they moved back to the Eastern end of Potijze. R.A.H.Q. had been at White Farm since 3rd November and 2nd Division H.Q. since 4th November. 1st Division H.Q. were at Hooge (about 1 mile south-west of Westhoek).

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phonic communications blown to pieces past repair, felt their powerlessness to take their proper part in the defence when the critical moment arrived. Such a bombardment too must presage an attack of more than the usual severity.

The bombardment had been raging for more than an hour and a half when Major Clark had a timely inspiration. He recalled that an intelligence summary, which had been issued some time before, stated that the German artillery preparation usually lasted for about two hours before the infantry assault was launched. He realised that the time was now fast approaching for the batteries to be warned so that they could fully help in withstanding the impact of the blow that was about to fall.

Major Clark and Captain Carrington, therefore, decided to make a dash through the shell fire and get back at once to the battery. Thus at about 8.30 a.m., accompanied by the signallers, they set out on the return journey. It was not a moment too soon. As the party started the German artillery began to lift and they practically returned through its fire, but, moving in extended order, they were fortunate enough to get through untouched.

The evacuation of the O.P. was carried out very thoroughly. Corporal Richardson, who was the last to leave, reported later in the morning that he had consumed the sandwiches which the battery commander had overlooked.

Meanwhile the 16th Battery, under Lieut. S. Atkinson, was firing slowly on its "night lines." This officer, later in the day, was wounded in the wrist by a spent rifle bullet. He remained, however, at duty.[1] Hardly had Major Clark and his party reached the battery (nearly a mile from the O.P.) when the British front line was seen retiring both between the southern portion of Polygon Wood and the Nonne Bosschen, and over the ground to the west of the latter. Major Clark at once opened a heavy fire on the south end of the Nonne Bosschen so as to delay the German infantry; and also to cause them as much loss and confusion as possible, whilst they were engaged in traversing the wood. Naturally, he had to be extremely careful how he used his guns on the left flank, as the 2nd Division were holding the southern edge of Polygon

[1] The only other-rank casualty in the 16th Battery, on the 11th November, was Driver W. Walkden who received severe bullet wounds in both thighs. (see p. 158).

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Wood, and, very shortly after his return to the battery, he received a message from the 1/King's saying that they were not going to move.

Captain Carrington went back at once to the wagon line to bring up a supply of ammunition. By the time he returned the German *1st and 3rd Foot Guard Regiments* had passed through the wood and were holding the northern corner and the western side. The ground behind the gun line was under rifle fire most of the day; but, roughly corresponding with the centre of the battery, there was an area that was always quite clear of bullets except those flying very high overhead. This path was used for the replenishment of ammunition. Captain Carrington brought the wagons up the lane from Westhoek behind the battery, and the rounds were then carried up by hand along the unswept path to the guns.

Soon after Westhoek came under fire the XLI Brigade H.Q. were isolated, as the telephone lines had been broken by the hostile shell fire, and the chief channel of communication became the Orderly Officer, Lieut. O. M. Lund. He was sent off to the Divisional H.Q. at White Farm, to report that all communications had been severed. As he returned to Brigade H.Q., Lieut. Lund warned the wagon lines to be ready to send up ammunition at short notice as it would be urgently required. On reaching Westhoek again, shortly before 9 a.m., the situation appeared to be serious, and Lieut. Lund promptly collected four or five gunners and drivers, the personnel of the Officers' Mess Staff of the 16th Battery, issued them with French rifles and ammunition, and then placed them in the sunken lane behind the left section of the 16th Battery. From this position the party opened fire on the Germans when they advanced from the Nonne Bosschen, and the men remained in action until their ammunition was expended. One of the party (Driver W. Walkden) was severely wounded whilst employed on this duty. Having posted this party, Lieut. Lund was sent to General FitzClarence's H.Q. (south of Glencorse Wood) to explain the situation in front of the XLI Brigade. But small parties of German infantry were now beginning to work forward and he was sniped at most of the way.

Major Clark had been shelling the Nonne Bosschen for some twenty minutes when, at about 9.15 a.m., Major Rochfort-Boyd

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suddenly arrived. As he passed the 16th Battery on his way to the 9th, he stopped and spoke to Major Clark. Major Rochfort-Boyd said that he had been in the front line near Lone House when the German artillery lifted back, and looking out to the front he had seen an unbroken line of German infantry[1] moving forward at a shuffling run through the mist. As they approached the British front line they suddenly opened out in front of him;[2] then, without firing but using the bayonet with a sort of grunting cheer, they closed with and passed over our front line, leaving Major Rochfort-Boyd behind them unnoticed. He now saw the German supports coming on and realised that he must try to rejoin his battery whilst there was still time. He jumped out of the trench, and, in his old pattern blue greatcoat he was no doubt unrecognizable in the drifting mist, thus he managed to reach the Nonne Bosschen ahead of the German supports. Hastening along the eastern edge of the wood he dodged the German infantry and reached the 16th Battery, to find the batteries already doing all in their power to meet the crisis that had arisen.

Actually the British line had given way on a front of about fifteen hundred yards between the left of the 1/Northumberland Fusiliers (3rd Division), holding the line immediately south of the Menin road, and the right of the 1/King's (2nd Division), holding the southern edge of Polygon Wood.[3]

Immediately the Germans had overrun the front line of the 1st (Guards) Brigade, a part of the *1/Foot Guard Regiment* advanced against the eastern side of Glencorse Wood. Here a line was rapidly formed along the edge of the wood by some of the 1/Black Watch reinforced by Colonel Carey's orderlies and headquarter men armed with rifles. The fight was short but sharp, then in face of the stubborn resistance that was offered the attackers

[1] Belonging to the *1st Foot Guard Regiment.*

[2] To pass on either side of the ruins of Lone House, also possibly to avoid British shrapnel that at this time was bursting in front of it. The 9th Battery had already started shooting on its "night lines" (see p. 161) and they were laid immediately in front of Lone House.

[3] Very early during the morning the 1/King's sent in the message which reached Major Clark (see p. 158) asking when the gap on their right was to be filled, as the battalion proposed to remain where it was. The battalion war diary for this day states that the 1/King's was "supported on the right by the Prussian Guards....." It held its position unshaken to the end. It can number few prouder days in its annals, which reach back to 1685 and include many of our greatest triumphs.

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sheered off to their right and were thus deflected into the southern end of the Nonne Bosschen.[1] But it is certain that before the *3rd* and *1st Foot Guard Regiments* reached the cover of the northern of the two woods they had suffered considerable losses from the fire of the British batteries opening on their "night lines," the unyielding defence of the mixed garrison of Glencorse Wood, of the Black Watch strong point, and of the 1/King's. The attack was considerably broken up, the assailants had become somewhat disorganised and intermingled, and they were glad to seek the shelter afforded by the Nonne Bosschen so as to reorganize before delivering a further onslaught on the British defences.

By 9.30 a.m. hostile rifle fire broke out from the western edge of the Nonne Bosschen, and small parties of German infantry soon began to work their way forward towards the line of the British batteries. It was at about this time that Lieut. P. H. Murray (orderly officer to the XXXIX Brigade, R.F.A., 1st Division) appeared, mounted, in the middle of the 16th Battery. He had come in a hurry to ascertain the position and was riding without a saddle. Major Clark informed him that rifle fire had opened up from the north-western edge of the Nonne Bosschen, but, owing to the dead ground in front, it was impossible to know how near the hostile infantry was to the battery position. Actually the battery commander was on the point of sending out dismounted patrols to reconnoitre the enemy in his immediate front. Lieut. Murray, however, at once called out, "All right, I'll clear up the situation for you !" and away he galloped between the battery and Westhoek cross-roads, disappearing at once into the dip in front.

Shortly afterwards he re-appeared on the other flank of the battery, capless, and pursued by rifle fire. He now informed Major Clark, definitely, that the bulk of the German infantry was holding the western edge of the Nonne Bosschen, but parties of them were considerably nearer to the guns. He said that he had come in a hurry because his horse, an excitable, pulling brute, disliked the bullets, and consequently he had lost his cap. Then, before anything could be done to stop him, he called out that he must go and find it, and at once galloped off again.

[1] The area of Glencorse Wood that is shown shaded on the maps was never seriously penetrated all day. The R.F.A. dismounted party was used whenever required throughout the day to strengthen the defence of the eastern edge of the wood.

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In a short time he re-appeared once more. He had now got the German positions far more accurately placed, and the information he brought in was undoubtedly of great value. During his second reconnaissance he had actually found and picked up his cap, but he was extremely angry because, whilst it was lying derelict, some careful German had dared to remove the badge from it! Lieut. Murray's mission being successfully accomplished, he set off at once to report to his colonel the exact situation west of the Nonne Bosschen.[1]

Before Major Rochfort-Boyd reached his battery it had already opened fire. The senior officer left with the guns, Lieut. A. L. P. Griffith, finding himself cut off from the battery commander, had already sent out signallers to repair the damaged line; and when the German bombardment had reached its greatest intensity, he had opened fire, at a moderate rate, on the "night lines." On Major Rochfort-Boyd's arrival at his battery, the guns turned onto the gap in the front line at a more rapid rate. The battery ammunition wagons had arrived between 8 and 9 a.m. They were quickly emptied and sent for more.

The Black Watch strong point, however, had not fallen to the *3/Foot Guard Regiment* in its advance. The garrison put up an admirably stubborn defence and, enfilading the assaulting lines as they passed, it caused the attack at this point to lose much of its cohesion and momentum before the cover afforded by the Nonne Bosschen could be reached. Thus it played its part in assisting to frustrate the break-through in this quarter. To the west of the Nonne Bosschen, however, the 16th Battery was now the British firing line.

To cover his exposed left flank Major Clark pushed out a dismounted party of about 4 men under Corporal Richardson,[2] and these men took up a position on the left rear of the battery, between it and the road. As it stood in action on this day the left section of the 16th Battery was commanded by Lieut. H. O. C. Anne; but No. 6 gun was temporarily out of action with buffer trouble and

[1] This extremely gallant young officer was killed in action on the 25th September 1915, as Lieut. (a/Captain).

[2] The small number available in this battery for dismounted protective work is accounted for by the fact that its commander had some days before sent all possible superfluous men back to the wagon line, both to assist with the horses and to avoid offering unnecessary targets in the battery.

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did not fire at all on the 11th. After the battery had been searching its front and the Nonne Bosschen for some time with intermittent bursts of fire at 400 to 900 yards, Corporal Richardson suddenly came along the hedge to Lieut. Anne, and reported that a party of from 12 to 15 German infantry was approaching the two buildings (a cottage and a shed) which lay about 80 yards from the guns. "Section Control" was ordered for the left section, and No. 5 gun was at once turned onto the buildings with percussion shrapnel. Two shells were fired; both, however, failed to burst. Actually they passed clean through the thin lath and plaster walls. Changing at once to shrapnel, Fuze O, Lieut. Anne fired again. Two rounds had the desired effect. The survivors at once abandoned their attempt to occupy these buildings, and a subsequent examination led to the recovery of three bodies which lay just beyond the houses. Hardly had the advance of this party been stopped than the heads and shoulders of another party, about a dozen strong, were observed moving forward towards a brick building close to the cross-roads and some 350 yards away to the north-east. No. 5 gun was swung round to enfilade this advance, and Lieut. Anne laid the gun, looking through the bore so as to ensure clearing the crest line. Even so the first round touched the ground in front and richochetted high over the target. The second round, however, was a complete success. It burst inside the building just as the Germans occupied it, and only one scarlet figure was seen to rush out. This man (covered with brick-dust from head to foot) was then promptly secured by a party of Highlanders who happened to be close at hand. This advance, too, had been defeated by gun fire. Immediately afterwards the 16th Battery signallers, a party of five men (Corpls. Richardson, Cook, Ware, Radson, and Bdr. Eustace) were sent to occupy the buildings just in front of the left section. They were half-hidden from the battery by the fall of the ground. The party was equipped with four rifles and one pair of binoculars. These non-commissioned officers maintained their position for the rest of the action, firing at the Germans holding the front edge of the wood, and doing considerable execution. Corporal Ware did the observing, and the reference point used was a biscuit tin in the wood.[1] The situation might be described as

[1] When the 2/O. & B. L. I. advanced at 3 p.m. the party went forward and picked up its bag.

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precarious, but for the moment the attack had lost its forward drive and had come to a temporary standstill in front of the line of guns, holding their ground so resolutely on the western side of the Nonne Bosschen.

Under the heavy fire of the 16th and 17th Batteries the leading lines of German infantry had halted along the edge of the wood, and were engaged in scratching up any cover they could so as to build up a firing line preparatory to a further advance. The 16th Battery continued searching the wood in quick bursts of ten or twelve rounds, great care being taken so that no damage should be done to our troops who were holding out in Polygon Wood; whilst the 17th Battery fired heavily at and into the northern angle of the wood, at ranges varying from 700 to 1000 yards. Major Bond also used some of his experimental H.E. against the enemy in this part of the wood[1] The result achieved was most successful, the shells detonating among the assailants drove them back into the cover of the wood and forced them to dig in there. This angle of the wood was also effectively enfiladed from the north by a section of French 75's. The French battery of 75's, in action close to Westhoek, also opened rapid fire occasionally on the ground beyond the Nonne Bosschen.

The 9th Battery, however, was rather unfortunately placed to meet this quite unexpected situation, for it was in action immediately behind the 16th, and was thus unable to co-operate directly and effectively in the close defence of the gap that had now been rent in the British line. Major Rochfort-Boyd, therefore, on returning to his battery, had to shoot unobserved fire at longer ranges, so as to delay the advance of German supports and reserves; but the ammunition supply in 1914 was not adequate for the maintenance of a very prolonged and heavy fire of this description. Also when the dismounted parties went out the fire of the 9th was masked for a considerable period by one of them. To find out exactly how far the enemy had penetrated, Major Rochfort-Boyd sent off Lieut. Griffith on a coverer's horse, to reconnoitre the front now reached by the German infantry. This position was very quickly ascertained, for the Germans holding the western side of the Nonne

[1] About 24 rounds had been issued to the battery for trial and report.

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Bosschen blazed away freely at Lieut. Griffith directly he rode into view. When Lieut. Griffith returned from his mounted reconnaissance he was ordered by Major Rochfort-Boyd to run a single gun out to the left front of the battery, both to cover the dip and to deal with the German infantry if they managed to work in on the left flank through the cottages and gardens. The gun was manhandled forward into position, and Lieut. Griffith observed from the roof of a cottage close behind. This gun, however, was not fired from this position on the 11th November.

So as to cover the immediate right of the 17th Battery, Major Bond had already sent forward 2/Lieut. R. T. W. Glynn and six gunners with rifles, and two bandoliers of ammunition apiece, to occupy a black wooden barn that lay about a hundred yards away from the battery. When he reached this barn 2/Lieut. Glynn found a sergeant of the 1/Cameron Highlanders, and the latter promptly joined the small party. 2/Lieut. Glynn disposed his men along the hedge around the barn, spacing them out at wide intervals so as to give an impression of superior numbers. He then climbed into the loft to carry out a rapid reconnaissance. Looking out he could see the German infantry in the Nonne Bosschen about 400 yards away. Then accompanied by the Cameron sergeant he went forward and examined the cottage to the left front, but up to this time it was not occupied by the enemy.[1] The Germans now began to work forward in earnest in this part of the field, and almost at once they became sharply engaged at short range with 2/Lieut. Glynn and his gunners. In this encounter the dismounted party more than held its own, for it stopped the advance of the German infantry towards the 17th Battery and undoubtedly accounted for several of the enemy. One enterprising German, who worked forward in advance of his comrades and managed to get within 150 yards of the party, was shot by 2/Lieut. Glynn. After about an hour the ammunition with the party began to run low, and 2/Lieut. Glynn then decided that he would return to the battery, both to obtain a further supply and also to make a report on the situation to Major Bond.

Meanwhile measures had already been taken to keep back the Germans on the right flank of the Brigade, so far as the means

[1] Eventually occupied by the Germans, and from which they were then driven by gun fire (p. 166).

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available would allow. A small party of about 20 signallers, cooks, servants, etc., with rifles was collected from Brigade H.Q. It was placed in position by Lieut. Lund and Regimental-Sergeant-Major S.E. James.[1] This party held the fences round a group of cottages about 400 yards in front of Westhoek cross roads, and was placed under the command of the brigade veterinary officer—Lieut. Williamson. On arrival at the cottages the party found about half a dozen infantrymen already holding the buildings, and these men joined Lieut. Williamson; also later in the battle another dozen infantrymen joined this officer's group.[2] Lining the hedges the party at once opened fire on the Germans who were trying to work forward. Owing to the undergrowth, only the Germans along the edge of the wood could be easily seen. Any men, however, who emerged into the field became an easy target and several were accounted for. But no serious attempt was ever made to advance over the open against Lieut. Williamson's position, and no German got within 200 yards of this dismounted party all day. In the afternoon one of the shells, fired at the Nonne Bosschen, swept up the wood and caused an immediate and rapid retirement of the enemy in its vicinity. As they rose from their cover in the undergrowth, the Germans presented Lieut. Williamson's men with excellent targets, and full advantage was taken of the fleeting opportunity. That all the men turned out with rifles did not recognise the gravity of the situation is made clear by the fact that one servant insisted on bringing with him his master's kit. He also burdened himself with a German helmet, a French rifle as well as his own, and one or two other unconsidered trifles, which he regarded himself as personally responsible for. The safety of all these articles was apparently of far more importance to him than the German attack only 200 yards away; and whenever the position of the party was changed he collected and checked his heterogenous belongings with the utmost thoroughness and deliberation. It is impossible to strike dismay into a man of this type.

[1] R.S.M. S. E. James served with the XLI Brigade from 1913 to 1916. In 1917 he was awarded the Meritorious Service Medal.

[2] Lieut. Williamson, on taking over the command, advanced with his party to the hedge about a hundred yards east of the cottages. Later in the morning he pushed forward another hundred yards closer to the Nonne Bosschen.

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The 16th Battery co-operated, in this close defence, by firing shrapnel with very short lengths of fuze at just sufficient elevation to clear the lip of the dead ground immediately in front, and using the cone of dispersion to search this area for the nearest Germans, whose line at one time was well within 300 yards of the guns. But shrapnel set at zero was never used. The task of watching the open ground on the left flank of the battery and stopping hostile movements on that flank was undertaken by the left section which had been detailed for that duty. Occasionally this section fired a shell over the buildings about eighty yards away to the left front, whenever the German infantry attempted to approach them. The 17th was employed in dealing with hostile infantry within 500 yards.[1] Major Bond used a portion of his small available supply of experimental H.E. shell[2] to drive the Germans from the house, 300 yards away, which they had now occupied. To engage this target, Captain Joll and Captain Stephenson assisted to run No. 4 gun round by hand to a gateway on the right of the battery, and Major Bond then fired two H.E. at the house, putting two direct hits on it, with gratifying success. This enabled him, after the battle had died down, to submit a most satisfactory report on his H.E. shell.[3]

[1] After the battle a Prussian Guardsman, killed by shrapnel, was found lying three hundred yards away from Major Bond's guns.

[2] On the 19th October 1914, the first thousand rounds of 18-pr. H.E. was sent out to France for trial and report. The 70th Battery (XXXIV Brigade, 2nd Division) is usually credited with firing, on the 31st October, the first round of experimental H.E. against the Germans north of Polygon Wood and about a mile south-east of Zonnebeke. Early on that morning Lieut. W. E. Maitland-Dougall (F.O.O. of the 50th Battery, XXXIV Brigade) reported the presence of a German mortar in their front line. The 70th Battery being ordered to send up a gun to knock it out, 2/Lieut. T. J. Moss of the 70th Battery was ordered to take forward a gun of his section. Soon after 10 a.m. this gun went up and came into action behind a hedge near the 5th Km. stone on the Passchendaele-Becelaere road. Opening fire with H.E. at 500 yards range, a direct hit was put on the German gun with the first round. Detonating on the gun it totally wrecked it, and incidentally it killed about fifteen German infantry who had selected this particularly unpropitious moment to leave their trenches alongside the gun so as to deliver an attack.

On the same day, 31st October, about 3 p.m., Lieut. R. Blewitt brought B gun of the 54th Battery (XXXIX Brigade, 1st Division) into action on the Menin road about 1,000 yards west of Gheluvelt, and with the second round knocked out, by a direct hit with H.E., a German field gun which was in action on the main road at the western exit from Gheluvelt.

But, from an entry in a private diary, it now appears that on 23rd October 1914, 18-pr. H.E. was issued to the 49th Battery (XL Brigade, 3rd Division), and at 11 a.m. on that day it was used, with the happiest results, against a German battery coming into action near Aubers. The battery was destroyed, most of the gunners being caught by the first salvo.

[3] On the next day, 12th November, the C.R.A. 2nd Division, in a report on experimental H.E., stated ".....the shell detonates well against houses....."!

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Earlier in the day the 5th Field Company, R.E.,[1] had been in dug-outs along the north-west side of Polygon Wood near the headquarters of the 5th Infantry Brigade. At about 9.30 a.m., the company commander (Major A. H. Tyler, R.E.) heard that the Germans had broken through on the 1st Brigade front, and he was ordered to assist in closing the gap. He at once sent a party (about twenty strong) to the trenches of the 1/King's, and then with the rest of his company he occupied a disused trench and a hedge between Polygon Wood and the Nonne Bosschen. A small party of Connaught Rangers joined his left flank; but the German infantry, now in the Nonne Bosschen, soon managed to enfilade the R.E., and consequently the right flank was turned back. The dangerous passage, however, between the two woods had been effectually denied to the enemy.[2]

When the company moved forward from its bivouac, the company cooks, five sappers, remained behind. These men joined some French guns in the vicinity,[3] and, on a French gunner being shot, the battery commander requested them to ascertain if any Germans were in a house which was about 400 yards away. The five sappers advanced against the house under fire from the garrison. When they arrived within a hundred yards, three sappers were left to provide covering fire, whilst the other two advanced to storm the house. Of the garrison of five, three promptly bolted, but the remaining two were captured. After handing over their prisoners to the French gunners, the sappers rejoined their own company, and were in time to take part in its dashing counter-attack at the end of the day.

The warm reception given to the German infantry, who had left the cover of the Nonne Bosschen and worked forward, brought their advance again to a standstill. Possibly the leaders considered that the hastily improvised firing line was a strongly held second line of defence; and they may have been strengthened in this view

[1] Based on the account mentioned in the list of authorities.

[2] One of the officers of the Field Company, Lieut. A. E. J. Collins, was killed whilst in this position. When at Clifton, in 1899, A. E. J. Collins made 628 not out, playing for Clarke's House v. North Town.

[3] The battery commander spoke English. The guns were probably the two 75m/ms which were in action south of the Westhoek—Zonnebeke road, and close to the 22nd Battery. (Map 1.)

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by the fact that the guns showed no signs of limbering up, but remained in their positions firing heavily, as if they had been specially placed to deal with just such a situation. Hesitation supervened on action, and the delay was fatal. The chance to smash through passed away and thus the momentum of the first victorious onslaught was lost.

Meanwhile other small reinforcements were arranged. The 35th Heavy Battery (four 60-prs.) was in action to the north-west of Westhoek and the guns had been co-operating in the defence by shelling the ground beyond the Nonne Bosschen.[1] The spare men of the battery were collected and placed under the command of 2/Lieut. S. H. Hyde Clarke (the officer i/c of the Battery Ammunition Column), and this officer proceeded with his party to Westhoek. Crossing behind the 16th Battery these men moved towards the two buildings in No Man's Land, on the left front of the battery, already occupied by the 5 signallers of the 16th Battery. 2/Lieut. Hyde Clarke was wounded by a rifle bullet and he was taken to the dressing station at Westhoek.[2]

On the other flank of the brigade, the transport officer of the 1/Cameron Highlanders (Major Haig) and Lieut. Isaacs, of the 1/Royal Berkshire Regiment, collected a small party of the 1/Cameron Highlanders and proceeded to occupy the farm house from which the enemy had been driven by H.E. shell. On arrival there they lined a ditch, and thus helped to secure this flank.

During the morning four wagons belonging to the 54th Battery (XXXIX Brigade, 1st Division) were coming up to the battery to replenish the ammunition. They were advancing along the track from Westhoek, which ran behind the 16th, when they suddenly came under short-range rifle fire. They left the track at once, but unfortunately they got into heavy going, and were soon in difficulties. One or two horses were shot and a wagon turned over. Rifle fire was then concentrated on this target. The wagon teams were doomed and gradually 23 horses were shot out of the 24.[3]

[1] Its ammunition expenditure on 11th November was 224 rounds (79 shrapnel and 145 H.E.).

[2] The Brigade Medical Officer, Lieut. R. Ellis, behaved in a most gallant manner all day. He went out on several occasions to attend to the wounded lying in the open and in full view of the German infantry.

[3] Captain Lee Warner of the 9th Battery went out and shot some of the badly wounded horses, who were kicking in agony in their traces.

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At the time this incident occurred, 2/Lieut. Glynn was returning to his party carrying a further supply of small-arm ammunition. To ascertain the exact situation he went into the cottage behind the right flank of the battery and looked out from an upstairs window. He then saw an abandoned ammunition wagon and a struggling team of four horses between him and the track from Westhoek.[1] He ran out at once and began unhooking the team so as to get the horses away under cover behind the cottage. He released one and led it away, and then, as he was unhooking another, he was wounded in the face by a rifle bullet. He was able to return to the battery and then managed to send a sergeant down to his party with the extra ammunition.[2]

Batteries in action beyond the flanks of the German penetration co-operated as far as possible in enfilading the enemy. To the south of the gap the 51st Battery (XXXIX Brigade), in action at the eastern edge of Sanctuary Wood, was employed in covering the 7th Infantry Brigade (3rd Division). Directly it was realised that the German infantry had broken through the line to the north of the Menin road, and that they had occupied the Nonne Bosschen and the northern and western edges of Glencorse Wood, the left section of the 51st switched over, under the battery commander (Major H. B. W. Smith-Rewse),[3] and opened at once on the Prussian infantry along the north-western edge of Glencorse Wood. The guns could only just clear the slight crest in front of the section at the very short range at which it was now firing. For the rest of the battle the two guns maintained bursts of rapid fire at short intervals on this target.[4]

[1] One of the drivers had been wounded and the other was looking after him.

[2] The small party was still in its original position.

[3] He was killed in action with his battery on the 20th November 1914.

[4] The war diary of the 7th Infantry Brigade specially records the effective assistance rendered by the 51st Battery both on the 10th and 11th November. Directly any hostile concentration or movement was reported, the battery opened fire at once, and, by searching and sweeping the woods in front of the 7th Infantry Brigade, the guns broke up the German formations in the woods. Consequently, during the critical hours of the 11th November, the enemy was prevented from delivering any mass attack on this part of the British line.

The No. 1 of F sub-section of the 51st on 11th November was Sergeant S. Woolgar. He went to France with the battery, became B.Q.M.S. of the XXXIX Brigade Ammunition Column, January, 1915, was promoted to Battery-Sergeant-Major with CCCXV Army Brigade in May, 1917, and became its Regimental-Sergeant-Major in January, 1919. He was awarded the M.S.M. in June, 1918.

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Further to the north the danger was also appreciated, and four guns of the 22nd Battery (XXXIV Brigade) were moved round so as to cover Westhoek and assist in driving back the German infantry who had broken through.

PART II.

NOON—DUSK, 11TH NOVEMBER, 1914.

Other and stronger reinforcements were also on the way. The 2/Oxfordshire and Buckinghamshire Light Infantry (5th Infantry Brigade, 2nd Division), about three hundred strong, were in divisional reserve near Verlorenhoek (on the Zonnebeke road, 1½ miles north-west of Westhoek). About 10 a.m. the battalion was ordered to move to Westhoek in support of the 1st (Guards) Brigade. The Oxfordshire reached Westhoek about 1 p.m., and, as far as they could, the companies took cover from the shelling that was fairly heavy at times.

On arrival, the commanding officer (Lieut.-Colonel H. R. Davies) and his adjutant went forward to the XLI Brigade headquarters and saw Lieut.-Colonel Lushington there. The general situation was then ascertained. Colonel Davies heard that the Germans were in the Nonne Bosschen and that the batteries, still in action in their original position, were only covered by small, hastily organized dismounted parties. Some time afterwards the Oxfordshire received orders from the 5th Infantry Brigade to clear the Nonne Bosschen and join up with the 2/H.L.I. (2nd Division), who were now holding the western side of Polygon Wood. Almost at the same time orders came from the 1st (Guards) Brigade to bring the battalion to the south-eastern corner of the Nonne Bosschen, and to join those troops of the 1st Division who were still holding out there. The batalion commander rapidly appreciated the situation. The Germans were in possession of the Nonne Bosschen behind the right of the 2nd Division, and within a very short distance of Westhoek, where French and British batteries were still in action covered only by an exiguous firing line. He decided that the 5th Brigade order must be obeyed, and he at once formed his battalion for the attack on the Nonne Bosschen.

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The batteries, luckily, had not suffered heavily from the German artillery. The 16th was most fortunate—this was possibly because it had not been long in its new position,[1] and consequently had not been accurately registered. The 9th and 17th were subjected to a fairly heavy shelling.[2] The situation must have been far from clear to the German gunners, for they also shelled the Nonne Bosschen at intervals throughout the day, and no doubt caused their own infantry considerable inconvenience, and, it is to be hoped, some loss. Our side, too, was not free from the unwelcome attention of its friends. Observers away to the northward must have found it quite impossible to realize what had happened; and a battery from that direction, firing into the area, enfiladed the French battery near Westhoek and took the 17th in reverse. One shell-head and fuze struck No. 6 gun limber of the 17th and a dud pitched in the battery as well, thus setting at rest any doubt about the nationality of the battery that was firing.

We left the 5th Field Company holding a line, with both flanks refused, between Polygon Wood and the Nonne Bosschen. After some time a house in the Nonne Bosschen took fire, and clouds of drifting smoke from it blew along the line and quickly obscured all view from the position, and made this untenable. Consequently the company had to retire, and it fell back to a hedge slightly in rear with its right flank well thrown back. This flank was held by a party of 15 R.E. and about 20 infantry (Connaught Rangers, etc.). This party now opened fire on the Germans in the Nonne Bosschen, and were able to enfilade some of the hostile infantry who were digging in the wood. The Germans responded by bringing up a machine gun and enfilading the right flank party. The situation became increasingly difficult, and Sapper T. Wilson volunteered to go back for further orders. Under heavy machine-gun fire he got through and returned with the order that the company would advance, linking up with the 2/Oxfordshire, who were counter-attacking at this moment. The R.E. line was an inspiriting sight for the 16th Battery, as it rose up and dashed at the parties of

[1] It had previously been in action at the south-eastern edge of the Nonne Bosschen. Partly, too, it was due to the reasons given on p. 153, and in footnote [2] p. 161.

[2] The 9th Battery suffered several casualties from the German rifle fire. Undoubtedly these would have been far heavier had it not been for the cover provided by the gun-shields.

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the German *3rd Foot Guard Regiment* outside the wood, bayoneting and shooting many of the enemy. Then, on reaching the original support trench, 400 yards away, the R.E. occupied it and opened a heavy fire on the retreating enemy. Thus, whilst our infantry were engaged in traversing the Nonne Bosschen, the left flank of the 2/Oxfordshire was covered by the gallantry and devotion of Major Tyler's small force.

It was nearing 3 p.m. when the 2/Oxfordshire advanced against the Nonne Bosschen. At this moment B and C Companies formed the assaulting line, whilst C and D Companies followed in support. Just previously half of A company had been lying down in front of the 16th Battery, having been placed so as to avoid both the blast of the guns and masking their fire.

Slipped at last from the leash the battalion advanced with fine determination, and its bearing at this crisis impressed many onlookers in the batteries of the XLI Brigade. The guns now lifted their fire beyond the Nonne Bosschen, whilst the Germans were still shelling spasmodically both the wood and the ground to the west of it. Moving in a south-easterly direction, the Oxfordshire passed diagonally across the front of the 16th Battery and then immediately disappeared from view into the dead ground that lay in front of the guns. As they did so they came in sight of the German infantry holding the Nonne Bosschen and a sharp rattle of musketry broke out from the western edge of the wood as the fight flared up for the last time. The battalion fought its way into the wood and through to the other side from north-west to south-east, accounting for the German infantry met with in the wood. On passing through the wood the Oxfordshire found many killed and wounded Germans lying there, a testimony to the accuracy and effectiveness of the British shrapnel. On emerging, the Oxfordshire linked up with the 2/Highland L.I. on the left and the 1/Northamptonshire Regiment on the right. Thus a line was formed, practically including the Black Watch strong point which had beaten off all attacks and was still holding out.

Meanwhile, after firing for a few minutes from the old support trench, the R.E. decided to press on. Their further advance, however, lacked the cohesion of the first blow, and the company, splitting up into small parties, failed to achieve any results at all

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comparable with its first charge. The German defence hardened, German machine guns came into action among the ruins of buildings in the old British front line (possibly among the ruins of Lone House), and a heavy fire was concentrated on the various parties. It was not long before Major Tyler and Lieut. Renny Tailyour were both shot, and gradually the parties had to withdraw to the line of the support trench now held by the 2/Oxfordshire. Finally, about 4.30 p.m., orders were received for the R.E. to be drawn back, and what was left of the company was then pulled out of the line.[1]

After the line had been reorganized to the east of the Nonne Bosschen, there was still some distance to go before the original British line could be retaken. Could the advance have been continued at once then the Germans would probably have been driven back to their original morning positions. But just at this moment some French guns near Zonnebeke, not realising how far the counter-attack had progressed, opened on the front line of the Oxfordshire with shrapnel. It took some time to explain the situation, and when the French shelling had ceased the light had entirely failed, the rain had turned into a downpour, and any attempt to advance further on the same day was out of the question. A night attack that was proposed for 1 a.m., after the moon was up, had also to be abandoned.

Thus the result of the great Guard attack on the 11th November was a withdrawal of our front line for about 300 yards on a front of less than a mile. Against this small gain the Germans had to set a not excessive casualty list among their picked regiments.

Five hundred dead and wounded, however, are said to have been found in the Nonne Bosschen according to reports rendered after the recapture of the wood.[2] That the critical situation that

[1] The casualties of the 2/Oxfordshire and Buckinghamshire L.I. on 11th November were 27—5 killed and 22 wounded.

On this same day the 5th Field Company R.E. lost 3 officers and 5 other ranks killed and 1 officer and 10 other ranks wounded. On 12th November the company was without any officers. During November it lost two commanding officers, one, Major A. H. Tyler, R.E., being killed on the 11th.

[2] According to their regimental histories, the *2nd Guard Grenadiers (Kaiser Franz Grenadier Regiment)*, who attacked through Veldhoek, lost on 11th November 15 officers and about 500 other ranks. They state that they made 100 prisoners and captured 3 machine guns.

The losses of the *1st Foot Guard Regiment* on 11th November are given as 16 officers and "well over" 800 other ranks.

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arose on the 11th November, after the front line had been broken, was not appreciated by the units some distance in rear, is proved by the entry for this day in the war diary of the 2nd Divisional Ammunition Column. It begins as follows: "Nothing of importance . . . ." [1]

* * * * * * * *

Once the Nonne Bosschen had been retaken and our line definitely established to the east of the wood, the surviving Germans who had penetrated close to Westhoek were gradually rounded up and brought in.[2] As he was brought past the left section of the 16th a big German non-commissioned-officer called out to Lieut. Anne:—"Ach! your shrapnel was too hot for us!" It was a little later, in the gathering dusk and pelting rain, that a German Guard officer, wounded but able to limp along, was led by an infantryman from the left across the line of the guns of the 16th Battery. As he noticed Major Clark in the gloom, the German saluted stiffly and said, "*Offizier!*" Then as they traversed the breadth of the battery a short conversation took place in German. The German officer asked where our reserves were. Major Clark's reply was to point to the guns. Obviously unbelieving, the German officer then asked what troops stood behind. The curt answer was, "Divisional headquarters!" This convinced him, and from the depths of his heart was wrung the exclamation—"God Almighty!" At first amazed, he was now overwhelmed, and his thoughts must have been indeed humiliating and bitter. For at last he realised that the British front had been broken through, and for over two hours between the Germans and a great, possibly a decisive victory, had been only the grim line of defiant guns and a few small parties of indomitable riflemen. As an ancient historian wrote more than twenty centuries ago, "In war, opportunities will not wait";[3] and Napoleon ex-

[1] The headquarters of the Column was on the Reninghelst—Poperinghe road, about six miles south-west of Ypres and about ten miles from the Nonne Bosschen.

[2] The I. Corps A. & Q. diary on the 12th November only records that 1 officer and 44 other ranks had been taken prisoner. This entry must refer to the 11th November, as on that day only one prisoner is mentioned (see page 175).
The regimental history of the *1st Foot Guard Regiment* states that Feldwebel-Leutnant Schwarz was captured. He may be the officer who spoke to Major Clark.

[3] Thucydides.

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pressed the same thought equally strongly when he said, *"profitez des faveurs de la fortune lorsque ses caprices sont pour vous; craignez qu'elle ne change de dépit: elle est femme."* [1]

* * * * * * * *

On a day when mobility and rapidity of advance were all-important, there can be no question that the German infantry was overloaded. The men were encumbered by wearing their great-coats. The going was heavy and particularly so in the numerous rootfields, and men wearing regulation greatcoats must have found it almost impossible to press on with any dash or rapidity.

The false security offered by the Nonne Bosschen also had much to answer for on the 11th. Once the Guard infantry had gained the shelter of the wood, then the usual things happened: formations became broken up, intermingling took place, cohesion and forward momentum were lost. Remaining in the wood, the enemy found they were in a veritable shell trap, and one from which they were incapable of breaking out to the front and resuming the attack. For in front of the Nonne Bosschen stood three batteries, who promptly took full toll of the target presented to them; and it soon became clear, to even the most determined among the enemy, that any attempt to advance further through the well-burst shrapnel was foredoomed to failure. Thus gradually the assailants were immobilized, the upper hand was gained, and the way was prepared for our infantry, before the close of the battle, to re-establish the British line beyond the Nonne Bosschen.

It is possible to appreciate the damage done by the British shrapnel and its stopping power from the number of German wounded who were attended to at the XLI Brigade Dressing Station. It is now known that altogether very nearly 300 cases passed through the Brigade Dressing Station at Westhoek as a result of the fighting on the 11th. They were not all brought in on the day of the battle, but they continued to come in, in rapidly diminishing number, during the next three days as the battlefield was cleared: and of these casualties all, except about a dozen, were German. Further, the Medical Officer remembers that the wounds were practically all from shrapnel, thus testifying to the damage done by the batteries.

[1] Commentaires, VI. 278 (Campagne de 1658).

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The evacuation of the cases was not easy during the fighting. All walking wounded and also unwounded prisoners had to be sent back along the Frezenberg road in charge of anyone who was available. Thus one party of two officers and about fifty other ranks was sent back in charge of a Highland officer with a smashed arm and a sergeant with the other arm broken.

The evacuation of the stretcher cases was complicated by another cause. This was the enormous size of the Prussians. Some of these men must have been over 7 feet in height. When placed on stretchers on the floor of the ambulance it was found impossible to close the tailboard on them, and they overlapped the canvas of the stretchers by several inches.

* * * * * * * *

[1]The ammunition expenditure recorded for this day in the war diaries was as follows:—

9th Battery[2]	.....	400 rounds (about)
16th ,,	.....	662 ,,
17th ,,	.....	682 ,,

* * * * * * * *

As the chief business of military history is to set down the facts so far as they can be determined, so it is not incumbent on the writer to express his personal opinion on the discipline, endurance, and indomitable defence maintained by the XLI Brigade in the face of overwhelming odds and at such a crisis. Rather it is proper to conclude by placing on permanent record the messages received by the XLI at the close of the action, both from the G.O.C., 2nd Division (Major-General C. C. Monro, C.B.), and from the C.R.A. 2nd Division (Brig.-Genl. E. M. Perceval, D.S.O.).[3] The messages speak for themselves:—

[1] It has been impossible to arrive at the casualties of the XLI on 11th November, as neither the brigade diary nor that of the 9th Battery give any figures.

[2] The rounds fired probably did not exceed 400. But this is only an estimate made by one of the battery officers who was present. The war diary furnishes no record. It must be remembered that the ammunition available in 1914 was very restricted in quantity. On 11th November the total expenditure of 18-pr. ammunition, for the nine batteries of the 2nd Division, was 2835 rounds, giving only an average of 67 rounds per gun in action. (C.R.A.'s diary, Appendix XVI.a.).

[3] Copies are in the C.R.A.'s Diary.

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To XLI Brigade.

B.M.92. 11th [November].

I forward the accompanying message from G.O.C. 2nd Division, with very great pleasure and hearty congratulations.

E. M. PERCEVAL,

From R.A., 2nd Division. Brig.-Genl.

Time 5.10 p.m.

To XLI Brigade.

B.M. 91. 11th [November].

My best congratulations to the splendid XLI Brigade, R.F.A. They have behaved to-day as they have on every occasion in this war. I am very proud to have the honour of serving with them.

C. C. MONRO,

From R.A., 2nd Division. Major-General.

Time 5.5 p.m.

No other honour than this message was bestowed on the officers and men of the XLI Brigade, R.F.A., for their feat of arms on the 11th November, but in 1914 such a message was considered by all concerned sufficient reward and no one looked for more.

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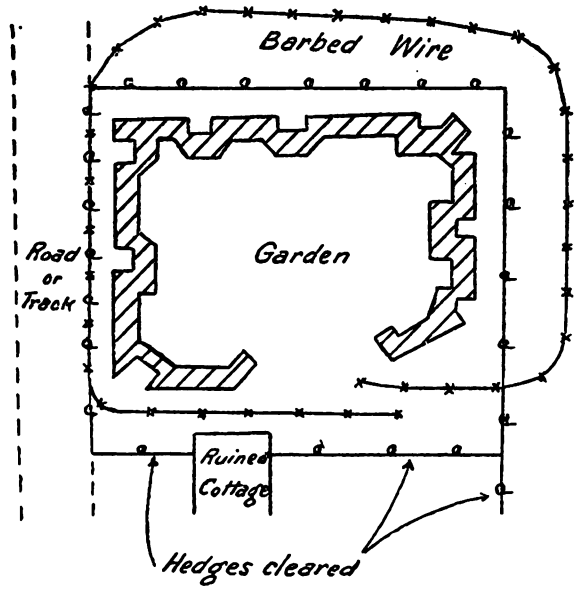
APPENDIX 1.

Rough plan of the strong point held by Lieut. F. Anderson & C Company, 1/Black Watch, on the 11th November 1914.



The work measured roughly 20 yards by 12 Aparados was provided everywhere. It was sited behind the thick hedges of a garden. The garrison was about 40 men.

This strong point held out all day, & the front line was re-established about it in the evening.

Note. The above plan & description are taken from "Notes from the "Front, Part III," page 55 (published February 1915.).

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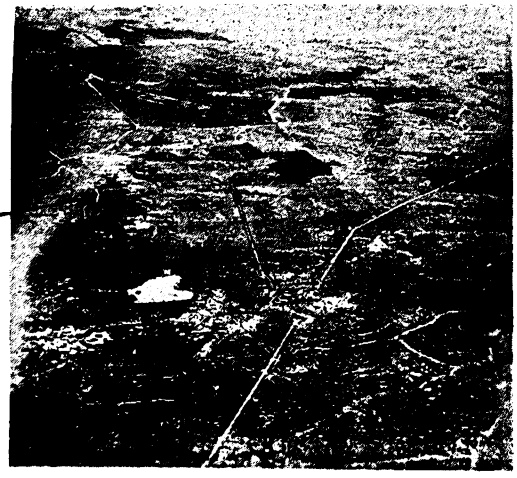
The Battlefield, 11.XI.1914.



(Taken in 1917)

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APPENDIX 2.

A Short Summary of some of the Designations and Services of the 9th, 16th, and 17th Batteries prior to August, 1914.[1]

9th Battery:

Raised in 1758 as a company of the Royal Irish Artillery, it became a company in the 7th Battalion, Royal Artillery, at the Union in 1801. In 1827 it became 4th Company, 7th Battalion, R.A.[2]

In 1859 it was 1st Battery, 1st Brigade, R.A.; A Battery, 1st Brigade, R.A., in 1871; and it became 9th Field Battery in 1889.

The Battery, under the command of Captain Adam Wall, took part in the Peninsular War, 1808-9, and was in the Retreat to Corunna, 1808-9.[3] It was employed in Northern France in the latter half of 1815, and in December, 1815, and January, 1816, it was at Antwerp. It was in the Egyptian War of 1882, and was engaged in the Battle of Tel el Kebir.

16th Battery:

Raised in 1771 as a company of the 4th Battalion, R.A., in 1827 it became 5th Company, 4th Battalion, R.A.

In 1859 it was 2nd Battery, 9th Brigade, R.A.; B Battery, 9th Brigade, R.A., in 1861; I Battery, 1st Brigade, R.A., in 1877; and it became 16th Field Battery in 1889.

The Company, originally formed in the Rookery Walk Barracks in the Arsenal, Woolwich, has long been known in the Regiment as "The Old Rooks."

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[1] I am indebted to Lieut.-Colonel J. H. Leslie, late R.A., for reading this summary and very kindly making some corrections and additions to it.

[2] The Companies did not receive numbers until 1627. Previous to that date, they were known by the Captain's name.

[3] See Wall's Diary in the *Proceedings of the R.A. Institution, Vol. XIV., p. 329.* The battery was not engaged in the battle of Corunna.

To avoid confusion to-day the term "Battery" has been used throughout in giving the various war services. But in Peninsular times the unit of Foot Artillery was designated a "company," whilst the term "brigade" was given to guns on wheeled carriages to which one of the companies of Foot Artillery was temporarily attached for service in the field. At this time the drivers were furnished by the Corps of R.A. Drivers, an organisation that was quite distinct from the Royal Artillery. Thus the unit formed and equipped in this manner corresponded with the Field Battery to-day; but it was called:—

Captain ———'s Brigade of 9-pr. guns (or whatever the nature of the ordnance might happen to be).

From "Services in the Peninsular War," by Major J. H. Leslie, R.A. (1908.)

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The Battery took part in the American War of Independence: engaged at Bunker Hill[1] in 1775, it was constantly in action between 1775 and the expedition to South Carolina in 1780. It was employed in the Netherlands in 1794; it was then engaged in the West Indies in 1796, 1803, 1804, 1809, and 1810.

In June, 1805, the Company, previously commanded by Captain William Payne and now apparently under Captain Charles Younghusband, seems to have been at Barbadoes. Together with other troops, it was embarked on Lord Nelson's Fleet; and this sea service, in that wonderful year whose echoes are ringing still, deserves more than a mere mention. On the 4th June Lord Nelson's Fleet of ten sail of the line, searching for Villeneuve, reached Barbadoes. *Northumberland* (74) and *Spartiate* (74) were at Barbadoes and joined the fleet on its arrival. Lord Nelson now heard that Br.-Gen. R. Brereton (commanding the troops at St. Lucia) had reported the day before that Villeneuve with 18 sail of the line had passed, on the night of the 28th/29th May, going southward and apparently leading for Tobago or Trinidad. On this intelligence, it was finally decided to proceed at once to Trinidad, and to embark a military force to assist in the operations on arrival. Consequently, Lieut.-General Sir William Myers, Bart., (Commander-in-Chief in the Leeward Islands), and about two thousand soldiers, were taken on board the ships. The June Muster Book of *Victory* shows that she embarked at Barbadoes on 5th June, General Myers and his staff of five officers, as well as Lieut.-Colonel Charles Shipley, R.E., and the following officers and men of the Royal Artillery:—Lieut.-Colonel E. Stehelin (534),[2] Captain George [Charles] Younghusband (832), Captain-Lieut. Blaney Walsh (903), Lieut. Saumarez du Bourdieu (1001),[3] Lieut. Fras.

[1] Although the Battle fought on 17th June, 1775, is named Bunker Hill, after the more prominent height on the Charlestown peninsula, yet the chief fight raged around the redoubt, sited by the American Colonels Prescott and Gridley, on the lesser eminence, Breed's Hill, which lay about a thousand yards to the south-east of Bunker Hill, and overlooked both Charlestown and the landing places in its vicinity. Breed's Hill redoubt was finally stormed by the British troops at the third attempt, but in their retreat the Colonists undoubtedly experienced some loss whilst crossing Bunker Hill on their way back to the Charlestown Neck, which joined the peninsula to the mainland. After the battle the British erected a large redoubt on Bunker Hill, so as to close the approach across the narrow Charlestown Neck. Both Bunker Hill and Breed's Hill appear to have obtained their names from settlers.

[2] The numbers refer to Kane's List. In two cases the Muster Book shows the wrong christian name, the correct one is given in square brackets.

[3] Killed at the Siege of San Sebastian on 21st July, 1813.

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Issued with the Journal of the Royal Artillery. Vol. LII. No. 2.

[To face page 180.

MAP I

YPRES, 1914

XLI R.F.A. IN THE BATTLE OF NONNE BOSSCHEN

Wednesday, 11 Nov. 1914,

Dawn — Noon.

[To face page 180.

MAP 2

YPRES, 1914

XLI R.F.A. IN THE BATTLE OF NONNE BOSSCHEN

Wednesday, 11 Nov. 1914,

Noon—Nightfall.

1st Foot Guard Regt., from about 9.30 A.M.—3 P.M.

●●●●● Line reached by German infantry.

Scale

Yards 500 4 3 2 1 0 500 1000 Yards.

0 ¼ ½ ¾ 1 Mile.

British Line at night

Original British Line, before the attack

The shaded portion of Glencorse Wood was never seriously penetrated on the 11th November.

2/O.&B.L.I. just before the counter-attack

Dressing Station

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[Frederick] Robertson (1189), Lieut. William Wylde (1161), Sergeant-Major James Battersby, and 135 other ranks, R.A. *Victory* carried no other troops at this time.

As Lord Nelson had originally suspected, the information about Villeneuve proved to be false; and on the 12th June at Antigua, by Lord Nelson's order, General Myers and his staff and all the R.A. were transferred from *Victory* to *Northumberland*. Lord Nelson and his Fleet then sailed for Gibraltar, as information had now been received that Villeneuve, steering north, had passed Antigua on the 8th June. The June Muster Book of *Northumberland* shows that all the above "supernumeraries" were transferred to her from *Victory*, and it further states that all these troops were landed by *Northumberland* at Barbadoes on the 22nd June, and the sea-service of the Company terminated.[1]

In 1815 the Battery was in Belgium, but it was not engaged at Waterloo. It took part, however, in the Allied Advance and it was present at the occupation of Paris. It next took part in the Boer and Kaffir Wars, 1842-48; it was in the Crimean War, being engaged in the 3rd, 4th, 5th and 6th bombardments of Sevastopol in 1854; and it was in Afghanistan in 1878.

17th Battery:

Raised in 1771 as a company of the 4th Battalion, R.A., in 1827 it became 8th Company, 4th Battalion, R.A.

In 1859 it was 5th Battery, 1st Brigade, R.A.; E Battery, 1st Brigade, R.A., in 1871; and it became 17th Field Battery in 1889.

The Battery took part in the American War of Independence: engaged at Bunker Hill in 1775, it was constantly in action between 1775 and Cornwallis's surrender at Yorktown on the 19th October, 1781. It was employed in Ceylon in 1803; in Java in 1811; and it was in the Crimea, being engaged in the 2nd, 3rd, 4th, 5th and 6th bombardments at Sevastopol. On the 17th August, 1855, the captain of the Company, Captain A. Oldfield, was mortally wounded, in No. 14 Battery of the Left Attack, by a large mortar shell that burst just in rear of the battery.

[1] The authorities for this round voyage are the Muster Books quoted above, and also a letter of Captain T. M. Hardy's, dated "*Victory*, off Antigua, 12th June, 1805." It is written to his brother-in-law, J. C. Manfield of Dorchester, and it is to be found in *Three Dorset Captains at Trafalgar*, by A. M. Broadley. Further information is to be found in Mahan's *Life of Nelson*, and in *Lord Nelson's Dispatches and Letters*, *VI*, 445-455. The Muster Books are at the Public Record Office.

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PACK OR SINGLE DRAUGHT.

By Colonel C. De Sausmarez, C.B., C.M.G., D.S.O.

WHEN the 1st and 2nd Mountain Artillery Brigades were formed in 1920 at Bulford and Shoreham respectively, there was, it is believed, no intention of using them in close support of infantry against an equally well-armed enemy in ordinary country; their intended rôle was to supplement field artillery in the event of Great Britain being at war in a mountainous country throughout which artillery on wheels could not operate effectively, the theatre of operations being so far removed from India that it would not be practicable or desirable to borrow for the purpose mountain batteries on the Indian Establishment. It was not long, however, before several officers interested in the subject, including some who were holding Army Staff appointments, began to revive the movement, started in the early years of this century, in favour of mountain batteries being used in close support of infantry in ordinary country. This movement took shape through the experience gained in manœuvres in Northern India, when it was found that in an attack over broken ground in a country not mountainous—and not necessarily hilly—mountain batteries were sometimes able to creep up quite close to the firing line and open fire unseen by the enemy. This was the first phase of the movement. The second phase began at the close of the Russo-Japanese war.

The claim (based on their experience in manœuvres against a civilised enemy) made by a few of our mountain artillery veterans that mountain batteries would be useful in, or close up to, the firing line of an attack was borne out by the experience of the Japanese in actual warfare. The country over which the operations extended was partly mountainous but the mountain artillery was used with great effect in the non-mountainous portion. It was found that the field artillery, once in action, had great difficulty in moving forward; but the mountain artillery, taking advantage of accidents in the ground, crops, etc., could often be brought up to some captured point thus enabling the Japanese infantry to repel

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local counter-attacks. During the battle of Mukden the 11th Japanese Regiment was attacking a village where the Russians were strongly entrenched with four machine guns. These machine guns forbade the Japanese infantry to move, and it was determined to send forward two mountain guns to deal with them. The Officer in command took advantage of a narrow, shallow, sunken road, and by this approach they arrived in pack at a small hamlet within 500 yards of the Russian position with the loss of one or two men wounded. Coming into action behind a wall, through which holes were bored as embrasures, they smashed up two of the machine guns almost immediately; the other two were hastily withdrawn. Four more mountain guns were sent forward by the same concealed route, and with a six gun battery supporting them at a range of 500 yards from the enemy, the advance of the Japanese infantry was no longer held up. The lessons learnt in the Russo-Japanese war, emphasised by General Kuropatkin's expressed regret that the Russians had no mountain artillery, were recognised by our General Staff. In the Field Artillery Training Manual which was still in existence in 1911, the duties of mountain or pack artillery as an arm of close support were graphically described, and the exacting nature of the task was recognised. To quote the drill book:—"Work of this nature not only requires a high standard of efficiency among the personnel, but also bold and skilful handling by the commander on the battle-field." There ended the second phase of the movement.

Mountain artillery officers began to be hopeful that pack batteries would be raised for service at home, but the third phase was marked by a decided cooling off on the part of the authorities. Some in high places are said to have observed that pack batteries could be organised for war when war actually came, and need not be maintained in peace. Nevertheless, the question was not completely dropped, since the subject for the "Duncan" Essay for 1911 was entitled "Pack Artillery; its organization and employment in:—

(a) Desert warfare.
(b) Field and Siege operations.
(c) Home Defence."

This allowed mountain artillery officers to air their views, and it is

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said that one competitor advocated either the immediate formation in the United Kingdom of pack artillery brigades (one for each division of the Expeditionary force), or the amendment of the drill book in respect of the "high standard of efficiency of the personnel" and the "skilful handling by the commander." No essay submitting this recommendation was published, but the drill book was suitably amended, the next edition containing no reference to "high standard of efficiency" or "skilful handling."

The third phase of the movement may be said to have ended in the subject being "talked out," as is done sometimes (according to the parliamentary reports) in "another place." With limited funds at their disposal to meet a danger which seemed to grow more and more imminent, it was only natural that the army authorities hesitated to commit themselves to an expensive innovation which had never, in Europe, stood the test of actual war.

In 1920 the case was different; here were two mountain artillery brigades in England, formed—it is true—with the object of using them as a supplement to field artillery in a minor war, but actually in being and at hand for testing the theory that pack artillery in close support of infantry would be of value. It was not long before the seed, sown (as previously stated) by officers interested in the subject, was found to have fallen upon good ground. The first indication was a change in nomenclature from "mountain" to "pack," authorised by an A.C.I. published in July, 1920. In a staff ride held by the G.O.C. 3rd Division at Cheltenham in the early autumn of that year, a pack artillery brigade, to be used in close support of the infantry, formed part of the attacking force. It was not however until the training season of 1921 that the application of the principle to the actual training of the troops was initiated. The pack artillery brigades were armed at first with the 2·75″ gun which from experience in actual warfare was fast falling into disrepute, whereas the reputation of the 3·7″ howitzer grew higher as time went on. Connected with the question of close support was that of a counter to tanks. Could one weapon perform both functions? Meanwhile, the gun being obsolescent, the batteries were re-armed with the howitzer. Was the 3·7″ howitzer suitable as an anti-tank weapon? This last question may be regarded as being still *sub judice* and it is not proposed to attempt to discuss it here beyond remarking that the

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exclamation "fancy using a howitzer as an anti tank weapon" is not an argument in any way convincing; and that the fact that on pp. 19 and 20 of Field Service Regulatons, Vol. II, the 3·7″ howitzer is described as an effective anti-tank weapon at close ranges when fired with its full charge, does not imply that a better one cannot be found.

Combined training with infantry has been regularly carried out by pack brigades during the last three training seasons, and the 3·7″ howitzer as a weapon of close support has been found to possess certain disadvantages, more or less serious:—

(1) The number of animals required to move in pack, viz.:— 8 per gun, and consequent slowness in coming into action and limbering up.

(2) The weight of the projectile, 20 lbs., which does not permit of more than 8 rounds being carried normally on one pack mule, and necessitates three ammunition mules per gun in the firing battery in addition to the 8 mules above mentioned.

(3) The large target which—except in close country—this large number of mules is bound to present.

(4) The bulk of transport required from ordnance factories to convey to the firing battery a shell which is perhaps unnecessarily heavy for the task of close support.

As regards (1) trials have been carried out with shortened shaft draught, and it is hoped that each of the four pack brigades now on the home establishment will have an opportunity, during the current training season, of thoroughly testing a design which will admit of the whole gun—including shields and trail legs—being transported in draught by a single animal. Even if this design prove to be successful, it will not be a perfect solution of the difficulty, since a move up a steep incline for any distance will probably necessitate the addition of an extra mule in tandem. As regards (2) an ammunition box has been designed which will carry 5 shell, if necessary, instead of 4, and ordnance mules are quite capable of carrying this extra load (10 shell instead of 8) for short distances, e.g. from first line to firing battery; but 3 extra pack mules accompanying a gun into action may be a blot on the

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landscape in more senses than one. As regards (3) the nature of the country must always be a big factor, for any accompanying animals, whether artillery, led horses or first line transport. It is conceivable that in exceptionally close or difficult country pack transport may be the only method of getting guns up unobserved to a position sufficiently close to the firing line. As regards (4) the peculiar task of close support is not the only task of which the 3·7″ howitzer is capable. Mobile close support will be required primarily in the attack; very little, if at all, in the defence; and the 3·7″ howitzers will be a valuable asset to the C.R.A. in a defensive action, for firing at ranges up to three miles.

Against these disadvantages many infantry officers who have carried out combined training with trained pack batteries have little but praise and appreciation for their work, and regard them as a valuable auxiliary for close support work in the attack. There is no doubt that whatever may be the decision as to the future rôle of pack batteries the experiment of combining their training with that of infantry battalions has proved to be a wise one; in that it has brought the two arms together in a manner, perhaps, never before achieved (at all events since the days of Moore and Wellington), and enabled each arm to understand the difficulties as well as the possibilities of the other much better than has hitherto been the case. The value of this increased knowledge to officers of both arms who may rise to high command is obvious. It would therefore be a pity if this practice of closely combining the training of the two arms should cease merely because pack batteries armed with 3·7″ howitzers are not considered suitable to form part of the divisional artillery.

The problem is how to make these batteries more efficient for close support work than they are at present, and the factors affecting this problem may be enumerated as under:—

(1) The pack artillery on the home establishment may be required in substitution for field artillery in mountain warfare. No better gun than the 3·7″ howitzer exists for this purpose; and as mountain artillery work requires a special and complicated drill, training with pack animals is necessary in peace.

(2) If artillery for close support work is essential (no suitable track vehicle having as yet been designed for the purpose), it is

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in the interests of economy to allot this alternative rôle to the pack artillery now existing. The work cannot be done as efficiently by trench mortars, and trench mortars would be valueless against tanks, whereas the most hardened scoffers would scarcely deny that the 3·7″ howitzer is better than nothing for anti-tank work.

(3) War establishments for a pack artillery brigade allow per gun in the firing battery :—

(a) 1 animal in draught,
(b) 2 in pack (one for the rear trail legs and one for the shield), and
(c) 3 in pack for ammunition :
total 6.

The improved arrangements for shortened shaft draught dispense with (b), but the form of draught is not an easy one for going across country, in view of the weight to be drawn and the weight on the animal's back; and an extra mule in tandem may often be required. The number of animals per gun with the firing battery is too large, even when moving the gun in draught.

(4) The number of guns per infantry brigade is four, very inadequate for close support in the attack. Assuming an attack on a two battalion front with two battalions in support, two guns would be allotted for each of the two leading battalions. If the two supporting battalions are required to continue the attack, a fresh section of close support artillery should be available for each; the number of guns available for a brigade should therefore be eight, not four. This would mean doubling the number of 3·7″ howitzers per division, a great asset for the C.R.A. in a defensive position, when these howitzers are not required for mobile close support work; but an expensive addition in the personnel and animals unless the existing establishments can be suitably decreased.

The solution suggested is the introduction of a limber, capable of holding four pack transport boxes, each filled with five shell, with (perhaps) another box containing special rounds for use against tanks; and of a draught animal capable of pulling at a walk over ordinary country the extra weight involved. The total weight with the limber filled would work out approximately at one ton. One pack ammunition mule, carrying eight rounds, would accom-

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pany the firing battery. This mule's load could be placed on the limber and the mule used in tandem if required.

The following table shows how the number of personnel and animals would be affected, if the number of 3·7″ howitzers per battery were doubled, and each supplied with a limber.

Existing establishment for 2 guns (half-battery of 4-gun battery).		Proposed establishment for 4 guns and limbers (half-battery of 8-gun battery).	
Firing Battery.			
Draught animals	2	Draught animals	4
Pack animals for trail legs and shields	4	Pack animals for ammunition (1 per gun)	4
Pack animals for ammunition	6	Pioneer mules	2
Pioneer mules	1	Telephone mules	2
Telephone mules	1		
Total animals	14	Total animals	12
Drivers	14	Drivers	12
First Line			
Pack mules (additional for guns and carriages)	10	Relief draught animals (1 per 2 guns)	2
For relief	4	Pack mules for sub-section stores	4
For sub-section stores	2	Draught mules for foreparts of 12 G.S. wagons	24
Draught mules for foreparts of 6 G.S. wagons	12		
Total animals	28	Total animals	30
Drivers (16 for 16 pack and 6 for 12 draught mules)	22	Drivers (6 for 2 relief draught animals and 4 pack mules, and 12 for 24 draught mules)	18
Total per half battery of 2 guns, 42 animals and 36 drivers.		Total per half battery of 4 guns, 42 animals and 30 drivers.	

That is to say for every four guns on the proposed establishment as compared with every two guns on the existing establishment, a saving of six drivers would be effected and there would be no increase in the number of animals. There would be an increase of 18 in the gunner ranks for detachments alone if the full establishment of 9 per gun is considered necessary, even though the guns

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do not move in pack. The drawback to this proposed establishment is that sections would not be able to move in pack complete. They would not, however, be entirely immobile as all-pack units, provided a sufficient number of saddles were included in the equipment which were capable of carrying more than one load, e.g. saddles for breech, chase, cradle, or ammunition boxes, and saddles for wheel and axle or shields and slipper.

In a section (2 guns) of the proposed establishment there would be :—

2 draught animals with pack saddles.
2 pack animals for ammunition.
1 pioneer mule.
1 telephone mule.
} in firing battery.
1 relief draught animal with pack saddle in first line.
2 pack mules for sub-section stores.

These would be sufficient to move one gun in pack with one pair of ammunition boxes (10 rounds). More ammunition in canvas bags could be carried forward by hand or slung across the saddles of riding horses. The power to use one gun of a section in pack would be useful in a case, for instance, where our infantry have captured a system of trenches. The captured works, though probably too full of trenches and deep labyrinths to admit of guns being brought up in draught, would not present any great difficulty to the movement (one at a time) of the guns in pack, and the infantry would not have to shout for long for guns to support them against a possible local counter-attack, or in their own further advance. If one more relief draught animal and one or two extra pack mules per section were included in the establishment of the first line the task of moving one sub-section in pack would be made easier. The proposed establishment does not indeed allow for more than the absolute minimum; and these three extra animals per section would probably be worth the additional cost of upkeep entailed. Not more than one of the three should normally carry a load.

There is nothing illogical in the plan suggested. In the existing war establishment the majority of the ammunition carried by a battery in the field is contained in vehicles which must be brought up to a point not far from the gun position; the battery or detached section (despite the large number of pack animals allowed) cannot

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move, complete with the whole of its ammunition, on an all-pack basis. The proposed establishment, whilst drastically cutting down the number of animals per gun in both firing battery and first line and so rendering possible the employment of double the number of 3·7″ howitzers with a comparatively insignificant increase of personnel and animals, does not altogether deny the power of movement in pack. If the suggested alteration in the war establishment should prove itself to be worthy of consideration, the next problem is to arrange that the pack batteries at home shall be capable of being trained for war, both as artillery for close support of infantry in ordinary country, and as mountain batteries on an all-pack basis. If this cannot be done without extra expense in respect of the upkeep of personnel and animals in peace time, the whole proposal will probably fall to the ground.

The following tables show a comparison between the number of animals and drivers, (A) for 4 guns on the existing peace establishment and (B) for 8 guns, "horsed" in accordance with the plan suggested.

(A) Existing peace establishment, 4 guns.

	Animals	Drivers
Guns in draught	4	4
Trail legs	4	4
Shields	4	4
Additional on change to pack	10	10
Relief	8	8
Ammunition	4	4
Pioneer	2	2
Telephone equipment	2	2
Sub-section stores	2	2
Foreparts of L.G.S. wagons	8	4
Spare	2	2
	50	46

(B) Proposed establishment, 8 guns.

	Animals	Drivers
Guns and Limbers	8	8
Ammunition	8	8
Relief for guns and limbers	4	4
Pioneer	4	4
Telephone equipment	4	4
Sub-section stores	4	4
Foreparts of L.G.S. wagons	16	8
Spare	2	2
	50	42

From the above it will be seen that, with the number of animals and drivers allowed for 4 guns on the existing establishment, 8 guns could be moved if the principles of the suggested plan were applied, and there would be an actual saving of 4 drivers. We could therefore allow 58 instead of 54 gunners on the peace establishment,

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making a total of 76 "gunner ranks" exclusive of the 8 N.C.O's promoted from drivers. With comparatively few pack animals to watch on the line of march, the number of gunner ranks per detachment might well be reduced (for the purpose of manœuvres) from 9 to 7 or 6, i.e., 56 or 48 for detachments of 8 guns. This would leave 20 or 28 over for other duties. There would be no vital necessity, therefore, to add to the existing establishment, even if the 4 extra howitzers, "foreparts" etc., were issued in peace for the period of manœuvres, *provided* the batteries were well up to establishment at the time; this, alas, would practically never be since (though all ranks might be bursting with health) some of the personnel would be on furlough pending embarkation for overseas.

In most years, however, a pack artillery brigade of 12 guns as it now exists, could easily supply two out of the three infantry brigades of the division with personnel sufficient for 8 guns per brigade. 16 guns with limbers and foreparts would be required in all, of which 12 would be available; the remaining 4 would have to be obtained temporarily from elsewhere. There would be no difficulty with regard to animals.

The ordinary combined training, which has proved so useful during the past three training seasons, could be carried out on similar lines, the essential point being that a battalion leapfrogging over another must not expect the pack section attached to the latter to support it in its further advance, but must have a section of its own with it; it would be better that each battalion should have a gun representing a section, than that one section should have to support the successive advance of two battalions. A section could never hope to live up to such a task in war, though it might struggle through with it successfully on peace manœuvres.

There appears therefore to be no necessity for a battery to hold the 4 extra guns with limbers and foreparts on peace charge. They could be drawn from mobilization store for training as occasion might arise, and the fact of the batteries retaining only 4 guns on peace charge would not matter, so long as it were recognised that they would be expanded to 8 guns in war, the necessary guns and vehicles being held in readiness preferably by the batteries themselves on mobilization charge.

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Whilst these batteries would be easily expandible in war to an 8-gun establishment for close support in ordinary country, they could not be expanded to anything beyond a 4-gun establishment for use in the mountains on an all pack basis, in substitution for field artillery. Their peace establishment is indeed rather low for this purpose, and for the purpose of training as mountain batteries. It will be noted in Table A on page 190, that only 10 additional mules are allowed as a change from draught to pack; this means that with these 10 mules the firing battery only of one section can be so converted. Provided, however, we have saddles interchangeable for the various loads as already indicated, the 8 relief mules and the 8 draught mules for ammunition might be utilised, and this would give a full firing battery for 4 guns (including 1 ammunition mule per gun), plus 6 mules for ammunition and/or relief. It might therefore be just possible for a battery to train as a *mountain* battery *in the mountains* for a short time, though it is far more probable that it would have to depend on another battery for animals to make it up to the necessary strength. Training as a section representing a 4-gun battery is of course another solution.

It may therefore be said that a pack brigade of three 4-gun batteries on its existing peace establishment has enough personnel and animals for it to train in peace sufficiently well to allow of its fulfilment of the required functions in war, with each battery expanded into either an 8-gun close support battery, or a 4-gun mountain battery approximately at Indian war establishment.

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CLOSE SUPPORT ARTILLERY.

By "Pompey."

SHORTLY after the close of the Great War the Stokes mortar was taken away from the infantry and, it being agreed that the six horse teams and heavy equipment of the field artillery were not suitable for the close up work in which the Stokes used to function, it was decided that the 3·7″ Howitzer should be the infantry's close support shell throwing weapon. This howitzer was the weapon designed for pack artillery and owing to our commitments in the mountains of India certain pack artillery brigades already existed. To introduce 3·7″ howitzer batteries incorporated in pack artillery brigades and to adapt these units to the close support work of our infantry was the simplest course to follow and, at first sight it was the best course because it made use of an equipment and an organisation which already existed and because pack transport has so many undeniable advantages in ensuring the move of a gun from one place to another. It was even possible to find theoretical uses for the brigade organisation and the brigade headquarters and only experience has shown that their uses during operations are but slight and their members too apt to become "passengers." The net result of this was that the 3·7″ howitzer, one of the very few ballistic successes of the war period, was adopted and manufactured (so far so good), but unfortunately it was conveyed to the army in a form which has gradually gained for it more and more opponents, until there are many now who definitely say that they would rather have more field guns and do away with the pack brigades altogether as part of a divisional artillery.

One understands that the present situation is that pack brigades are to have another year's trial and that this respite is partly due to the great efforts made by the pack artillery during manœuvres this year, where, although general opinion decided that their casualties would have been unbearably heavy, the pack gunners carried out their rôle of close support and liaison with such good will that they excited both admiration and sympathy.

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The object of this paper is to show that there is a need for the close support gun, that the 3·7″ howitzer will pull its weight in the Divisional Artillery, and that when these 3·7″ batteries are incorporated in field artillery brigades a great gain will accrue to liaison and co-operation between infantry and artillery.

To urge that a form of close support artillery should be retained.

Co-operation is an old word in the army vocabulary; *liaison* has become a popular word more recently, the theme must be ages old, so ancient that one is apt to regard both as a *fait accompli*, if one is granted good-will. Consider now the difficulties that lie in the way of establishing in peace time a close liaison between units of artillery and their corresponding infantry units. In the first place the British temperament is hostile, fundamentally, to good liaison. It is only necessary to watch a large dining table in a railway refreshment room gradually filling up with travellers, and to see how they all sit as far as possible from each other, to be persuaded of this British aversion to making friends with strangers. First one comes in and sits at one end, the second has a good look round and sits at the other end, the third views with visible distaste the fact that there are already two people sitting at the table and divides the interval between them, and so on. The gunners and infantrymen of two corresponding units start as strangers. If they had not been educated in isolation from each other at Woolwich and Sandhurst, and moulded into completely different types by the segregation camps of their early military careers, they would be less strange to each other and liaison would be more easily established, for at present community of tastes, interests and customs cannot by any means be said to exist. If, however, a brigade of infantry and a brigade of artillery were set down side by side in a small station where there were no other troops, a good liaison would almost certainly ensue in spite of these difficulties. Unfortunately this desirable combination seldom if ever occurs. The two most usual situations are that the corresponding brigades of the two arms will either be separated by many leagues or else that they will be thrown together in a place like Aldershot, where soldiers swarm in such profusion that identity is almost submerged—a busy ants' nest with the little ants all rushing round and bumping into each

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other but all too preoccupied to notice who it is that they have bumped into. So much for some of the difficulties of liaison.

The difficulties that lie in the way of achieving co-operation are chiefly those due to officers' lack of intimate knowledge of the detail, interior economy, capabilities, traditions, and the indefinable spirit of the other arm. This statement hardly requires enlarging on because most people know it to be true and one cannot improve the state of affairs merely by saying we must do so. It seems to be a quite unavoidable result of our training and organisation that it is the case, and it occurs to much the same degree in other armies, that infantry specialists and gunner specialists are produced, in mass as ignorant of each others work as a boiler-maker is of bricklaying. No doubt, after all, a jack of all trades is only useful in the elementary work of any of them and few sing his praise. It is all to the good, however, that the pack brigades have already assisted in bridging this gap and everything points to this being true; that the retention of close support artillery units which will come to be regarded as almost part of the infantry brigades, will introduce a greater degree of familiarity between certain elements, at all events, of the two arms. The contempt that familiarity is said to produce being in this case a contempt for the technical difficulties and mysteries of the other arms.

Many people say that co-operation and liaison between the two arms are already on a high level and that there is no need to fuss. For these optimists a few pessimistic paragraphs are necessary. A year or two ago the question of attacks and counter attacks at short notice was being studied at the Staff College and a number of good descriptions were given of such attacks made during the last war. These stories were told in most cases by infantry officers. In no single case had efficient artillery support been available for the attack described, in very few cases was there any mention of artillery at all, communications had failed, the ground was too bad, or "I don't know where they were, firing a barrage somewhere, I think." There was in fact a clear impression left by every story, that the artillery had failed, and it was most striking that this impression was not intentionally given, guns had just been forgotten, they were not in the picture. On the other hand, a gunner when consulted on the subject of close support guns said "You mean

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practically handing the guns over to the infantry. They don't know how to use them." And another said "I know an infantryman who was given a section of pack artillery and who told its commander to put the guns up some trees in order to fire down a communication trench." And now for the pessimists a little optimism is provided by a battalion commander who, in a bush whacking theatre of war, had a pack battery affiliated to his battalion. Mutual confidence became well established after some time and one day the battalion was ordered to capture a village. The battalion commander was asked what support he required from the divisional artillery and, in answer, requested that he might be allowed to depend on his pack battery alone. This sounds rather mad but the result was a few shells at the right time in exactly the right place, complete surprise and complete success. But still, in the piping times of peace, what with survey methods and bright ideas for defeating tanks, the gunnery problems of field artillery have become so absorbing that the gunner rather grudges the time he gives to the infantry, and the infantryman has to take too much for granted that he can't understand. The A.A. say they will hit the aeroplane, the field, medium and heavy say they will hit the map pin point, the infantry officer says what Brer Rabbit said, and, possibly, believes what he is told.

The case is a little bit different with the present pack artillery. Possibly a number of infantry officers look on these units as "One more — thing over which one can be caught out," but the pack artillery themselves have realised that for their particular branch of the service co-operation with the infantry and liaison with them is absolutely of the first importance, coming even before practice camp. It is also very noticeable that infantry commanders always draw a sharp distinction between guns placed under their orders and guns told off to support them. Give such a commander an artillery brigade to support him and you will usually find that he will take little interest either in the brigade or in the support he receives. Give him a battery under his orders and he will take a lot of trouble to be sure that he gets its fire put down exactly when he requires it. The close support battery would, of course, almost always be placed under the orders of an infantry commander because no one else's orders except for administrative purposes would ever reach it early enough to meet the situation of the moment.

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From all this one argues that infantry regard the close support battery in a different light to the ordinary field battery, are already getting familiar with it and using it themselves to meet their own tactical requirements, and no longer just leave its employment and the method of it to the gunner. And one can say quite definitely that in the close support battery one is training and will train a gunner a little bit differently to the ordinary field gunner, who will be, possibly, a little less of a gunner having assimilated a little of the infantry spirit.

This then is the first lesson of the argument, that by the retention of the close support gun you will continue to bring infantry and gunners closer together for two main reasons, first, that infantry officers will never forget about guns because they will always be having sections of close support guns under their command. The second reason is that these close support gunners will know and be imbued with the idea that they exist for the infantry. You will have then in the person of these close support gunners a number of representatives who will perforce be to some extent assimilated into the life of the infantry brigades, acting, in fact, as permanent liaison officers.

To urge that the 3·7″ howitzer should be retained but that its pack transport should be abolished.

In looking for perfection in the design of the piece of ordnance that is to be the armament of our close support artillery, we require of it three main characteristics:—

(1) That it shall be there when it is wanted.

(2) That it shall kill both men and tanks.

(3) That, owing to the shortage of guns, it shall be fit to take its place in the field artillery barrage or bombardment.

It was in order to meet the first of these requirements that pack transport was adopted, but after three year's experience opinion has turned against it. If the prize is to be awarded to the form of transport which will take a gun most surely over the worst type of country which exists for guns, over rocks, mountains, and through forests, the award must go to pack transport. There are, however, equally

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important considerations which affect the question of the gun being there when wanted, of which the outstanding ones are that the gun with men and animals must not be conspicuous or over vulnerable when in motion or when in action, and that the casualties it is likely to suffer can be easily replaced. It is in these respects that pack transport has been judged to have failed badly. There are in a pack battery far too many men, far too many animals and neither men nor animals are easily replaced. The men require more training than ordinary gunners of a field battery and they require better physique. The mule is an exotic creature and difficult to replace quickly even in an untrained condition, while the training of a mule for a pack battery is a matter of months, skill and patience. Outsiders do not realise the extent to which the mule is trained as a specialist, and since this form of transport has been allowed to exist for the close support artillery of a division of our expeditionary force, it is fair to say that very few people can have realised how quickly these units would have vanished in war owing to the impossibility of replacing casualties. Alternatively one would have to allege that the silence which has reigned regarding this most vital point has been Jesuitical.

As a basis of comparison as to the degree of mobility required one can take that of the Vickers gun. This is dependent for its arrival in the neighbourhood of the firing line, on a pair of horses in a limbered G.S. wagon with the alternative of 50% of the guns and a modicum of ammunition in pack. It has also this advantage over the small howitzer, that it can be carried by its detachment for a considerable distance, in emergency, so that the gun can go to places where its wheeled transport cannot. It is at a disadvantage, however, owing to the fact that its chief rôle in close support work demands that the target shall be visible from the gun, so that the place to which the gun must go is pretty sharply defined as a rule, whereas the small howitzer can function very well from anywhere within, say, a 500 yard radius of the observation point, and so is not similarly forced to try to enter a particular locality where perhaps its wheels would not allow it to go. The advantage which the freedom of this 500 yards radius confers on the light howitzer is so great that one can claim with confidence that if it were drawn by two stout horses and mounted on a good travelling carriage with its

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ammunition carried also in pair horsed vehicles, the infantry might confidently expect the close support of this howitzer in any country and under any circumstances where they could expect the support of their own machine guns.

As regards the second point—that the gun shall be an efficient man killer and a tank destroyer—it must be taken nowadays as an axiom that tanks can be stopped in the forward zone only by mines, barrages, tank counter attacks, or by something having the characteristics of an anti-tank machine gun. The anti-tank gun, whether it be 18 pr. or the close support weapon, cannot be relied on to function in an area which is exposed to enemy view. The gun sited on a commanding eminence to engage approaching tanks at medium ranges is all very well for a demonstration of an efficient gun crew, but is out of place in war, and so is the engagement of tanks at any range much above 500 yards. One cannot, with a light heart, throw heavy shells among our own infantry in the hopes of hitting a tank once, say, in every 20 shots. The rôle of the anti-tank gun is to cover about 500 yards of front in the main zone, and, when a tank appears, to hit it with the first shot. If a position has been chosen with any regard to tank proof localities, there will be very few of these 500 yards spaces on a divisional front.

There are four different phases during which guns may expect to be called upon to engage tanks :—

(1) When taking part in the fully organised defence of a position. In this case anti-tank work will very likely be taken over by 18 prs.

(2) When taking part in the defence of a hastily organised position. In this case the close support guns must expect to function.

(3) When an enemy counter attack is delivered during an attack made by our own infantry. This is the business of close support artillery.

(4) When faced with a surprise penetration by enemy tanks. It is the function of all artillery to be able to engage a tank under such circumstances, even if only by blocking the roads.

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In all four cases "action" with rapidity and accurate shooting at short range, "every time a cocoanut," is what is required of the artillery, whether close support or field.

The 3·7″ howitzer firing at tanks at short range is not an impressive sight, the jump and jar are terrific. There is reason to believe that this would be considerably lessened if the piece were provided with a good travelling carriage, but even so, no howitzer can be steady when fired with full charge, using full weight projectile, at very low elevations. Nevertheless the firing which takes place is, strangely enough, not inaccurate, and if the anti-tank rôle is regarded as an emergency rôle only, not often to be repeated, then it is possible that the 3·7″ howitzer may fill the bill, though it would be well to experiment with a lighter shell or some calibre reducing device in order to better its powers in this rôle. It is in any case regrettably certain that for the man-killing rôle you require a howitzer and that for tank destruction you would like a gun, but whereas, under the circumstances described above, the light howitzer may be expected to fill the anti-tank rôle with moderate success, a small gun will not do the necessary man-killing. For man-killing, enemy killing, in close support a heavy shell fired on a well curved trajectory is necessary, so that the piece and its gunner can nestle in comparative safety behind almost any available cover, and so that the shell when it arrives shall be a powerful agent.

It must be mentioned again at this point that the 3·7″ howitzer is a very accurate piece of ordnance, and it is not easy to design and produce such things. The 3·7″ is more accurate than the 4·5″ with which we have been content for so long as our field howitzer, and since also it throws a most effective shell, it must be considered capable of carrying out the double rôle better than any other gun which the British army has yet seen.

As regards the last point—that, owing to the shortage of guns it shall be able to take its place in the field artillery barrage—there are some who will disagree and will say that the close support rôle is so exhausting that the guns ought not to be called upon to fill this barrage rôle as well. Until recently the writer was numbered among these dissentients but, with the hope of seeing four close support batteries in the divisional artillery, and with a shortage of

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guns as the paramount consideration, he is forced to recant and agree that the close support gun must be capable of taking an efficient part in the field artillery barrage during the opening stages of the attack. It may be that only the reserve guns will be called upon to engage in this task, but the capability must be there, or too much gun power would be locked up for use in exploiting a success which might, owing to the shortage of guns, never occur. As regards this last point, then, the 3·7″howitzer fulfils the conditions very well. The fact that it is the ballistic success of the war has already been remarked on. It is understood that it would be inadvisable to tinker too much with its carriage for fear of impairing the ballistics but that there would be no difficulty in improving it for travelling and in providing it with a small limber. Finally it can be provided with a shrapnel shell, that is to say that in the opening stages of the attack and up to the limit of its 5900 yards range it can take its place alongside the 18 prs. with more than an equal prospect of carrying out its task successfully, for it is accurate and fires a bigger shell. In fact the 3·7″ howitzer fulfils this last condition very thoroughly, and if pack transport and mules were done away with and an economical establishment were prepared for its batteries, this howitzer would certainly fulfil all the conditions necessary for a close support gun far better than any other piece we have yet seen.

To consider the question of how 3·7″ Howitzer or other close support batteries should be incorporated in the divisional artillery.

[Pack, draught, mechanical or winged the principle is the same.]

The reasons in favour of keeping the close support batteries organised into one brigade are chiefly those which emanate from the difficulties attending the more logical course of including those batteries in field artillery brigades. First you require three of these batteries, one to each infantry brigade, and, if you add one to each field brigade you make five batteries in the artillery brigade, and that is one more than the O.C. brigade and his signal section can properly deal with. Moreover there is no accommodation available in peace time for this fifth battery, so the suggestion is quite impracticable.

Secondly, you would have in one unit a sub-unit like a lamb

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among goats. The personnel of the close support unit are supposed to be selected men, and the unit itself will, it is hoped, be very much smaller than the ordinary field battery and will contain many less horses. The close support battery would not, therefore, be able to compete on even terms with the field batteries in any of the ordinary competitions of every day life, and on the march, except when marching with infantry, could not keep pace with the rest of the brigade. Lastly, then unless you are going to weaken the divisional artillery still further in gun power you must have a fourth field brigade for which there is no ready made niche in the divisional artillery.

Beyond these three reasons stands out the fact that pack brigades already exist and that there must be a first class reason before breaking up an institution which already exists in favour of something new and untried. The first objection can only be defeated by reducing one 18 pr. battery per brigade. The number of batteries in a field brigade has already been increased from three to four and this is a reasonable limit which already taxes the power of the field brigade headquarters quite sufficiently. The substitution of a 3·7″ battery for an 18 pr. battery would relieve the congestion in the present field brigade barracks and avoid much expense by avoiding making additions to these barracks. The second objection is also a good one, and the lambs will be mixed up with the goats, but only experience can show whether or not this really matters very much. The close support battery will have its football teams and its pairs of horses and will always be fighting an uphill fight. It requires very long sight into the future and a very deep insight into the minds of men to enable one to decide rightly whether it matters or whether, on the contrary, this continual striving against odds may not re-act beneficially on the unit. As for the marching difficulty, this will not often occur as the close support batteries nearly always march with their infantry; in other cases these batteries will have to have a separate place in the column and march table. Lastly, you cannot weaken the divisional artillery any further so you must have this fourth field brigade, even if in peace it may have to be a lower establishment brigade in order that the four field brigades as suggested will show a financial saving as compared with the three field and one pack of the present day.

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It has been argued that the fourth close support battery could be dispensed with and that it would have a miserable time, out of place in peace and in war always in the forefront of someone else's battle. In answer it may be said that what one loses on the swings one gains on the roundabouts. Few gunners would mind a little less combined training in peace and in war, and this little supernumerary unit, destined as a storm troop for the next attack, would surely be nursed for it in the comparative luxury of the back areas. If this organisation is ever adopted then, in war, the divisional artillery will consist of eight 18-pounder batteries, four 4·5″ how., and four 3·7″ how batteries, organised into four field brigades of equal establishment. The rôle of three of the brigades has special reference to their affiliated infantry brigades, while the fourth is a reserve which would only leave the C.R.A's control in emergency as, for instance, when its 3·7″ battery, previously nursed as suggested, might be used to make a second 3·7″ battery in support of the attack of an infantry brigade on the most tricky portion of the front. These four artillery brigades will be stronger than the present four, because not only will there be one extra battery, but the 3·7″ howitzer with a draught organisation will be a less exhausting gun to use and more readily available than the present 3·7″. Further advantages claimed for this organisation in war are as follows:—

(1) The anomaly of an artillery brigade commander without a proper command in action will be done away with. Three artillery brigade commanders will be responsible for the artillery support of their respective infantry brigades, and the infantry brigadiers will each have to deal with one artilleryman only, instead of two, whatever form of support they are concerned with.

(2) The close support batteries will be better catered for as regards supplies and their interests will be better safeguarded because the headquarters responsible for their welfare is bound to be in closer touch with them, than the present pack brigade headquarters which have to deal with its three batteries widely separated and acting under the orders, in all probability, of three different infantry commanders.

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(3) There will be within each artillery brigade officers, men and animals available as immediate reinforcement to keep the close support batteries in action in the event of their having suffered severely. If all these close support batteries were included in one brigade, these emergency reinforcements would be much harder to provide.

In peace time there are many advantages to be claimed for this incorporation of the close support battery into the field brigade, and as is only right the most important of all is that which holds good in war. One artilleryman only will be responsible for the support of, the liaison and the training with each infantry brigade. There is no differentiation between close support and any other form of support, it is all the business of the field artillery brigade affiliated to the infantry brigade concerned, and that is the right state of affairs.

The fact of the close support batteries being located in four different artillery brigades should facilitate grouping of artillery and infantry brigades for training purposes. In the First Divisional area, for instance, the situation would be ideal, the Guards Brigade would work with the artillery brigade at Ewshott, the 2nd Infantry Brigade would work with the artillery at Waterloo Barracks, the 3rd infantry brigade would work with the artillery at Bordon, and at Bordon the 4th, lower establishment, artillery brigade would be trained for war and available for training with the infantry during the absence of the third field brigade at practice camp. Except when a whole division with its artillery is absolutely concentrated you can not get such a good result as this so long as the close support batteries are all collected into one brigade and located in their one camp; so that a great deal depends on this grouping. It is not easy to get into very close touch with an affiliated unit which lives two or three or more weary hours marching away, and for the sake of liaison one demands the non-intervention of difficulties of this kind. Considering the question from the point of view of liaison only, and picturing the members of the close support batteries as agents employed for getting into touch with the infantry, one cannot question the fact that, if one wishes the liaison so gained to be disseminated throughout the divisional artillery, one must not gather in these agents at the end of their day's work and herd them

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together in an isolation camp, but rather they must scatter and continue the good work by going back to their different field artillery brigades and bringing some breath of infantry topics and personalities into their messes.

Having argued, then, at length to prove that there is room for such a thing as a close support battery to continue the good work already done by the pack brigade, that the 3·7″ howitzer is the most suitable piece, that pack transport should be dropped, and finally that the close support battery would be better off, do its work better and be more logically contained in a field artillery brigade; one is led into considering the matter very bluntly from the point of view of the amalgamation of the two branches of the Royal Regiment of Artillery. It seems that the job of the close support of the infantry was suddenly taken away from the field artillery owing to the unsuitability of their armament, and was handed over to the mountain artillery of India, owing to this branch of the artillery being possessed of a suitable gun. It might have fallen into worse hands for it was always "the pick of the army that handled the dear little pets," but it was very sudden. When it first happened people were so blunted by the horrors of war that this cataclysm aroused but little comment or even interest. At the most people said "the amalgamation will make it seem less strange!" That is a comforting thought, and, after all, the job might have been given to the Navy owing to their having such a much better gas mask!

The amalgamation may put things right in time, but close support of the infantry is still, as it always was, the job of the field artillery. At the present time all subalterns of field artillery of five years' service have to be nominated for service in a second branch of the artillery. The field artillery is and must be the chief recruiting ground for close support artillery officers. All the best and most active in mind and body get nominated for horse artillery or pack artillery and it is understood that the great majority would rather stay in a field artillery brigade than go to a pack artillery brigade. If you are going to establish a *corps d'élite* you must make its conditions of service at least as attractive as those of the corps from which you draw your recruits. If the close support batteries were included in field artillery brigades this would be the case. Give them a touch of colour in their uniform, a star in the Army

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List and you will draw volunteers, but the present situation is akin to that of the comedian thumping the table and saying "we must have a business government." One says most impressively "the close support artillery must be a *corps d'élite*," and one uses the press gang to find recruits for it! That is a sufficiently powerful argument to conclude this plea that field artillery brigades should be armed to carry out their proper rôle, that of supporting the infantry under all circumstances.

Suggested war establishments are appended for a 3·7″ draught howitzer battery.

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APPENDIX I.

3·7″ Battery (Draught) Transport.

DETAIL.	BATTERY HEADQUARTERS.			TWO SECTIONS EACH.			TOTAL BATTERY.		
	VEHICLES.	DRIVERS.	DRAUGHT HORSES.	VEHICLES.	DRIVERS.	DRAUGHT HORSES.	VEHICLES.	DRIVERS.	DRAUGHT HORSES.
Bicycles	1	—	—	—	—	—	1	—	—
Guns and Limbers	—	—	—	2	2	4	4	4	8
Wagons, G.S., forepart only for Ammunition	4	4	8	8	8	16	20	20	40
Wagons, G.S., forepart only for Signalling, Hotchkiss and S.A.A.	—	—	—	1	1	2	2	2	4
Wagons, G.S., forepart only for Pioneers and Misc. Stores...	—	—	—	1	1	2	2	2	4
Wagons, G.S., forepart only for Artificers and Veterinary Stores	1	1	2	—	—	—	1	1	2
Carts, Officers' Mess	1	1	1	—	—	—	1	1	1
Cart, Water, Tank	1	1	2	—	—	—	1	1	2
Kitchens, Travelling	1	2	4	—	—	—	1	2	4
Spare	—	3	6	—	4	4	—	11	14

NOTE :— 150 rounds per how. is allowed for, of which 30 rounds per how. is with battery headquarters.

(Present Pack Battery carries 114 rounds per how.)

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APPENDIX II.

3·7″ Battery. Personnel and Riding ponies.

DETAIL.	PERSONNEL.				ANIMALS.	REMARKS.
	Offrs.	Serjts.	R. & F.	TOTAL.		
2 Sections each.						
Subalterns	2	—	4	6	4	Includes 4 batmen.
Serjeants	—	3	—	3	3	
Bombardiers	—	—	4	4	—	
Gunners	—	—	10	10	—	
Assistants and Horseholders ...	—	—	3	3	3	
Signallers	—	—	6	6	2	
TOTAL EACH SECTION ...	2	3	27	32	12	
TOTAL TWO SECTIONS ...	4	6	54	64	24	

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APPENDIX III.

3·7″ Battery. Personnel and Riding Horses.

DETAIL.	PERSONNEL.						ANIMALS.		REMARKS.
	Officers.	Warrant Officers.	Staff Sergts. & Sergts.	Trumpeters.	Rank & File.	Total.	Riding Ponies.	Draught Horses.	
Battery Headquarters.									
Major	1	—	—	—	2	3	2	—	Includes 2 batmen.
Captain	1	—	—	—	2	3	2	—	Includes 2 batmen.
B.S.M.	—	1	—	—	—	1	1	—	
B.Q.M.S.	—	—	1	—	—	1	1	—	
Farrier Sergeant ...	—	—	1	—	—	1	1	—	
Farriers	—	—	—	—	2	2	—	—	
Saddlers	—	—	—	—	1	1	—	—	
Artificers, R.A. ...	—	—	—	—	1	1	—	—	
Trumpeters	—	—	—	1	—	1	—	—	
Gunners	—	—	—	—	3	3	3	—	Orderly, H.H., & Rangetaker.
Signallers	—	—	—	—	4	4	2	—	
Clerks	—	—	—	—	1	1	—	—	
Storemen	—	—	—	—	1	1	—	—	
Water duties	—	—	—	—	1	1	—	—	
Sanitary	—	—	—	—	2	2	—	—	
Cooks	—	—	—	—	3	3	—	—	
Total Battery Hd.-Qrs.	2	1	2	1	23	29	12	—	
Total 2 Sections ...	4	—	6	—	54	64	24	—	
Total Transport ...	—	—	—	—	44	44	—	79	

Total Battery :— Personnel ...137, Horses.....115 } Draught Establishment.

Total Battery :— Personnel ...208, Horses.....153 } Present Establishment (Pack).

4 Draught Batteries:— Personnel...541 Horses...460.

3 Pack Batteries :— Personnel...624 Horses...459.

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F.S.R. VOL. II, 1924, ON THE EMPLOYMENT OF ARTILLERY.

By Major H. R. Pownall, D.S.O., M.C., R.A.

OUR tactical ideas of 1914 have, as the result of the war and of progress of science, required much modification, and the years since the armistice have been full of experiment in new material and in new methods. The digestion of the lessons of a war, conducted in different theatres and against different types of enemy, is necessarily a lengthy process. Moreover tactics and organization, tactics and material, are interdependent; and the organization of our future Expeditionary Force and its armament were questions not hastily to be settled. In consequence, during the past few years many matters in connection with the employment of artillery have been controversial. Artillery Training, Vol. III, 1921, however well it summarized many lessons of static or semi-static war, required revision from the moment that the Chief of the Imperial General Staff laid down that "our training must centre round mobile warfare." Moreover it was a "Provisional" manual as was F.S.R. II, 1920, and therefore, in common knowledge, liable to amendment. The reports on the Newmarket and Buxton Staff exercises, definite though they were on the matters to hand, did not, and could not, deal broadly with the employment of artillery. And so it happened that the artillery, and no doubt the other arms as well, have had difficulty in finding an accepted and definite doctrine.

The advent of F.S.R. II, 1924, marks a new stage. We have now got the definite doctrine which we lacked. Inevitably a training manual of such general scope cannot fully survey the detailed handling of all arms, and many gaps still require to be filled in by a new edition of A.T. Vol. III, which will not be much longer delayed. In its absence a study of the new F.S.R. draws the attention to many points which were different, or non-existent, in the provisional manuals. It is the object of this article to deal with a few of the leading considerations affecting the employment of artillery, as outlined in F.S.R. Not that the whole book does not

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affect gunners, directly or indirectly, but a review on such a scale is beyond the scope of a single article, and probably also beyond one's powers and inclinations.

Fire Power.

"Infantry cannot advance against even semi-organized
Sec. 67.1. resistance unless that resistance is kept under subjection by fire power." A precept which is emphasized in different words, in different forms, in a dozen places in the manual. Artillery is, still, the greatest producer of fire power. To such an extent will the success of infantry be dependent on fire power, partly on that of their own weapons, but more on that of other arms, that it is laid down, and for the first time with such clearness, that when attacking an organized defensive position
Sec. 68.3. "the resources of artillery and tanks will generally govern the extent of frontage on which the main attack can be made." And it is to be expected that tanks themselves will need artillery support in increasing degree.

It is logical to argue from this that in the future the broad outlines of the "Infantry Plan" of attack will largely depend on the "Artillery Plan," or at any rate on the artillery resources available and their capabilities in the particular situation. There has perhaps been a tendency among artillery officers to contend that the Infantry Plan must be settled, and in considerable detail, before the gunner can be called on to state what manner of support he can provide. It would appear that in future artillery, tanks, and possibly aircraft will have a preponderating influence on the main features of the infantry plan. Details of their support will depend on infantry requirements, but mechanical support will call the tune; the greater the strength of the enemy defences the more will this be the case. Nor is it only in attack that fire power is a predominant consideration. In defence, although one of the desiderata of a position is that it should be protected by natural
Sec. 89.5. tank obstacles, yet "the framework of the defence" is still the artillery and machine guns.

Such being the importance to the infantry of the other arms supporting them, it is relevant to consider here the subject of co-operation.

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It has always been agreed, in principle, that to be effective, co-operation must be mutual. In practice it has not always been so, and it can be said without offence that failures in co-operation are not, in the majority of cases, due to lack of effort on the part of the artillery. The increased emphasis with which the
Sec. 26.4. infantry are charged with their share of co-operation can therefore be welcomed. They are reminded too that
Sec. 71.6. they have to "bear the brunt of any failure in co-operation."

It is *information* that other arms chiefly require from the infantry, of their own doings and of the enemy, and the infantry are charged not merely with procuring this information, but also (and this is new), of communicating it to the other arms.
Sec. 26.4. It is of interest to see that counter battery information is specially noted as being of particular value. Counter
Sec. 33.10. battery work is, in its essence, just as much covering fire to infantry as any other form of fire, and is not the independent artillery duel that it was once considered.

Ammunition Supply.

The mechanical support given by artillery to infantry is dependent not merely on the number of guns available but, especially in protracted operations, on the ammunition that is available. Our ammunition supply in mobile warfare
Sec. 9.4., will necessarily be limited, and F.S.R. calls repeated
etc. attention to this difficulty and to the need for careful husbanding of ammunition. The mechanicalization of ammunition echelons may appear to ease the situation to some extent, but it would be dangerous to count upon this. With the greatly increased air activity that may be expected in the future it is probable that ammunition railheads will be further back than they were; the mechanicalization of transport will permit of this, but in consequence we may gain no ultimate advantage, through mechanicalization, in the number of rounds delivered. Moreover if movement of rolling stock and particularly clearance of ammunition at railhead is limited to hours of darkness, which is to be expected in some degree, the problem will be further complicated.

Quite apart however from its transportation in the field the

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ammunition requirements of a war of the first magnitude are so great that it is hardly likely that our factory output at the beginning of a war will satisfy all demands. Shortage is to be expected. It is on the Expeditionary Force that such a shortage would fall.

Control of Artillery.

It is laid down as an axiom that in order to get full value from the long range of modern guns control of artillery
Sec. 72.5. "should be centralized in the highest formation which can exercise it without risk of failure . . . ." In the
Sec. 81.2. case of the deliberate attack this centralization may go so far as the C.R.A. of the Corps; in the encounter
Sec. 72.6. attack it will probably be in the Division or below. Chiefly it is a matter of communications, the more mobile the operations the more difficult the communications, and decentralization, no doubt down to the smallest units on occasion, will be necessary. The point need not be laboured further, but it is of interest to note that this decentralization extends,
Sec. 72.6. in appropriate cases, to the C.C.H.A. of the Corps placing medium artillery under the command of Divisions, always with the proviso that he shall take control again when he can effectively do so.

The nomenclature of various types of control and support has been a matter of much recent discussion. F.S.R. uses four phrases, "artillery under direct command of infantry brigade commanders"; "close support" artillery; artillery "support"; and
Sec. 72. artillery for "the direct support of infantry brigades." Various other unofficial terms are still in being, "affiliated," "attached," etc., and the argument rages as to which shall be used and as to what precisely they mean. It has been suggested that only two are really necessary. *Firstly* artillery "under the orders" of a certain formation. This when that formation is engaged upon a separate tactical operation. *Secondly*, artillery to "support" a certain formation; which shall include direct, close, or any other variations of support, which are a matter of detail. Thus an artillery brigade commander detailed to "support" an infantry brigade will understand that while he remains under the general control of the C.R.A. he must take all steps to

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help the infantry of that brigade, including the pushing up of his guns to close range if that is of advantage. If really reliable W/T or R/T can be obtained from O.P. to battery the present need to push guns right forward to ensure support will disappear. It is largely a question of verbiage, and perhaps not of the first importance. It is no new thing for the Gunner to be asked to serve two masters, and the experience of the war goes to prove that whatever the nomenclature the results are much the same.

Artillery Support of the other Arms.

The somewhat vexed question of "observed versus timed fire" is dealt with briefly and adequately. Although fire directed by observation is referred to as the "ideal," yet the difficulties in the way will "seldom allow of this form of support." It can well be left at that.

Sec. 72.10.

The "barrage versus concentration" controversy is still something of a stumbling block. Granted an adequate number of guns and enough ammunition a simple barrage on the front of attack "may prove the simplest and quickest method." Moreover it is independent, to some extent, of detailed information of the enemy dispositions. But unfortunately it is shortage of guns and ammunition that will be the trouble. The use of smoke can on occasion do all, or nearly all that is required. But it is accepted that it is by no means a panacea for all evils and has serious drawbacks.

Sec. 72.11.

There remains the "concentration." For concentrations to be effective they must come down on localities which are known to be held. This implies good information, which may not be to hand. The artillery commander is likely to be faced with insufficient guns for a barrage, unsuitable conditions for smoke, and meagre information for his concentrations. This accentuates the vital importance of information from the artillery point of view. It can only be obtained by land and air reconnaissance. It is on the amount of accurate information that is received from infantry sources that the effectiveness of artillery will largely depend. Artillery, like tanks, are best given "definitely located centres of resistance to overcome." It is perhaps as well to note, in passing, that "concentrations," like "barrages," are merely a

Sec. 73.3.

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form of covering fire, and the one merges into the other. Neither, in the case of light artillery, can be expected to have much destructive effect on material. To gain the full advantage of covering fire of either kind, infantry attacking the localities engaged by artillery will have to move close under that fire. It is suggested that "bombardment" is a suitable term for fire intended only to obtain destructive effect.

Sec. 73.5. A new paragraph in the manual lays down that "the protection of tanks is a particular responsibility of the artillery." We have been liable of late to consider tanks from the point of view of anti-tank defence, at the expense of tank support. Probably the latter is the more difficult of the two. In the initial stages of an attack it is fairly simple, but if tanks are to penetrate to any depth their subsequent support, which must be quick to be effective, will be a very pretty problem. To afford continuous support to tanks moving at 8-12 miles an hour with our present communications and a horse drawn gun is next door to impossible

Artillery in Reserve.

The previous F.S.R. II, 1921, laid down that in defence "mobile artillery should form part of the reserves of all formations, the weaker . . . . the . . . . artillery the more important . . . . the mobile reserve." This sentence has now been omitted and we are

Sec. 15.2. told "The necessity of employing every available gun . . . . will probably render the retention of artillery in reserve inadvisable." The change is of importance and is in line with the conception of artillery as being at all

Sec. 69.8. times a reserve of fire power in the hands of a commander. Other arms entered into the fight are involved beyond recall; artillery in action, especially if sited in depth, is not so committed and still retains, within wide limits, its power of concentration on any part of the front.

But the foregoing cannot be expected to suggest that all the artillery of all formations must at all times be in action. In fact

Sec. 94.8. we find on the subject of anti-tank defence the sentence "whenever possible positions which can be rapidly occupied by reinforcing artillery should also be pre-

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viously reconnoitred . . . ." The implied difference, if any, between "artillery in reserve" and "reinforcing artillery" may be left to A.T. Vol. III to unravel.

The above completes what is necessarily but a very limited survey of the contents of F.S.R. It may be said, and with justice, that there is nothing new. That was hardly to be expected. Most, if not all, of the questions have been matters of military discussion for some time past. What is really of interest is that decisions have now been given on matters controversial. The object of this article is merely to draw attention to some of the major points that concern artillery. And in the review of the contents of an official manual it is preferable to exercise a certain discretion than to draw freely upon personal opinions.

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THE PROBLEM OF THE TANK.

A Lecture delivered at The Royal Artillery Institution, Woolwich, on Tuesday, 18th November, 1924,

BY LT.-COL. F. A. PILE, D.S.O., M.C., ROYAL TANK CORPS.

Colonel H. S. de Brett, C.B., C.M.G., D.S.O., in the Chair.

THE CHAIRMAN: It is hardly necessary to introduce Lieut.-Col. Pile to an audience of gunners. Before the war he was here as a subaltern in the Riding Troop. His experience as a Brigade Major R.A. in the war, and his course at the Staff College preceding his transfer to the Royal Tank Corps should qualify him to tell us what artillerymen want to know about tanks.

LT.-COL. F. A. PILE: It is with the utmost diffidence I speak to you. I would rather you spoke to me, and that being so, I hope very much that at the end of my lecture you will ask any questions you like. More particularly would I like to try and answer any questions put to me by the junior officers. It is you I am trying to interest to-day. It is your weapon I am going to discuss. The senior officers may talk a lot about it, but in the great day the subalterns of 1924 will be handling it or destroying it. The Tank is the Youth of the Army. Sir James Barrie in his address at St. Andrews described "Youth and its Betters." You, the older services, are our betters. We have all the faults of youth and those faults may at times annoy you. We are inclined to be above ourselves, to make tremendous claims for our arm which you, our betters, may not allow. All restrictions are irksome and sometimes we resent being hemmed in by precedent. But we have youth's greatest asset, we are enthusiasts. We believe we have a weapon that properly handled will so quicken up war as to revolutionize it, and we want your kindly encouragement because, like every other arm, our sole object is to form a part of a victorious Army.

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The Problem.

The problem I want to bring before you is the difficult one of deciding as to how the enemy will most probably employ his tanks, and how best to counter him. You will see, as I continue, the trend of tank design towards a very light mobile tank, capable of covering considerable distances without refilling. You will hear the different theories regarding the employment of tanks in foreign armies. You will see that we may be forced to depart even from our own doctrines—and you will, I hope, see that to-day, whether on the march—in attack or defence—or even at rest in billets, unless covered by a tank-proof obstacle, you are never safe.

Tank Antecedents.

It is not my intention to spend any more time than is necessary on the genesis of the tank. There are, however, two points I want to make before leading on to the main subject matter of my lecture, and in bringing these before you I must delve somewhat into past history. Neither is it my intention to attempt to prescribe a method, universal in its action, for dealing with tanks. That is your business, and you are far better qualified than I am to come to some definite conclusion on the subject, for your rôle in war is the same to-day as it has always been—to protect and support the other arms. While we in the Tank Corps have two rôles—we have both to lead the attack and protect slower moving infantry. So that our thoughts inevitably turn more towards making plans for our own safety than thinking out how best to knock ourselves out. It is vitally important that we should all be honest with each other in this matter. If we claim too great an immunity we will suffer for it in the next war, and equally if you claim too great powers the whole army will suffer. Tanks are merely the latest attempt to embody one of the primal ambitions of man. That is to say to kill his enemy with the least possible chance of being killed himself. There is nothing new in the idea—even in the tank itself, as I will point out later, there is no new invention. In the middle ages such an idea was possible of realisation and the great power of the knights was based on their invulnerability. Before the general introduction of gunpowder a knight in armour was perfectly safe unless he met and was overthrown by another knight, or fell into a

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morass and, like the tanks at Passchendaele, became ditched. Provided he operated on sound ground he was to all intents and purposes invulnerable.

In 1769 Cugnot in France invented an automobile which he said would be very useful in war. The French government of the day was impressed and assisted him to make an improved machine. It was not, however, a great success as its speed was only $2\frac{1}{2}$ miles per hour and it could only run for twenty minutes at a time; after which it had to stop for fifteen minutes to get up more steam. In his first public trial Cugnot ran into and knocked down a stone wall. This so incensed the authorities that they cast him into jail as a public danger. Since then the land ship has made continuous progress. In 1801 Thomas German invented a series of rollers bearing on an endless chain as a substitute for wheels, this of course being the precursor of the present-day track. Year by year these were improved on and with the introduction of the internal combustion engine a tank became possible.

The interest in the evolution of the tank idea is not so much historical as psychological. The tank idea was always cropping up—as a rule it was pooh poohed by the enemy at first and hampered by the friend. The knights in armour were employed in swampy ground—Cugnot was put into jail. The best example of this frame of mind is the story of David and Goliath. David had the tank idea firmly embedded in his mind. He intended to hit and not to be hit. He was going to use his mobility so that he could keep out of the way of Goliath, and he was going to use his fire power in order to strike his enemy from a distance. At first all his friends said he was mad, and that he had better go home and mind his sheep. Then, as they saw he was determined, they tried to hamper him. They dressed him up in heavy armour and gave him a sword. Of course he knew better and discarded them. While Goliath, like Ludendorff and Hindenburg in 1917, did not believe in this new method of war and the result was disaster. It is far easier to invent a new weapon than to recognise the possibilities of that weapon and how it should be used. We have got a new weapon, a weapon far in advance of anything we had in the war, and we have yet to convince friends as to its value and to decide how best it should be used.

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The Evolution of the Tank since 1916.

On the 15th September, 1916, 49 Mk. I tanks went into action. Only nine of these succeeded in pushing ahead of the infantry, though some of the remainder did good work in mopping up. Except for its tail, which was very soon found to be a useless encumbrance and was done away with, the Mk. I tank was in shape almost identical with the Mk. V, a tank that is still in use in many armies including our own. The tail was a very cumbrous method of steering the tank. It was very apt to get out of order and, of course, was very vulnerable. There were other serious weaknesses in this tank. The petrol supply was inside the tank and a direct hit set it on fire. Observation from inside was very difficult. The average speed was 2 m.p.h. with a maximum of 3·7 m.p.h. This tank was a thoroughly inefficient machine. It was rapidly improved on and in 1917 the Mk. IV became the standard fighting machine of the Tank Corps. It was a great improvement, it was faster, more easily driven and the petrol supply was put outside the tank. It was proof against A.P. bullets which the Mk. I had not been.

The Mk. V tank is the real infantry tank. It is very easy to drive, has a maximum speed of 5 m.p.h., and can do a round trip of about 25 miles. About the same time as the Mk. V tank was introduced, certain battalions were equipped with a faster tank known variously as the Medium A and the "Whippet." It was not altogether a success, though it did prove very valuable towards the close of the war. It weighed 14 tons, had a maximum speed of 8 m.p.h., was very difficult to drive, steering being effected by varying the speeds of either engine, one engine driving each track. This tank was followed by the Medium C., a tremendous improvement, but unfortunately too late for trial in the war. And now we have the light Vickers. For some years it seems more than probable that the Vickers tank will be our standard machine. In many ways it is an excellent tank. It has good speed, 15 m.p.h. across country, a very big radius of action, is easy to drive, and light on its tracks. It is not ideal for all purposes. It can only cross a 6ft. trench and is very noisy. The armament consists of one 3-pdr. gun, two M.G's and three Hotchkiss rifles. The trend of tank design right from the commencement has been towards a faster and lighter machine. We have not achieved finality but

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it can be fairly said that the light Vickers tank is as much an advance on the Mk. V as that tank was on the original Mk. I. Before going on to discuss the tactics laid down for British tanks, I would like to spend a few minutes in telling you something about the tank situation in foreign countries.

Foreign Tanks and their Tactics.

The most interesting armies to-day from the point of view of tanks are the French, the German and the Union of Soviet Republics. The French because they put a higher value on tanks than perhaps any other army. The Germans because they have none—at least they ought to have none, Russia because we know very little about her, but undoubtedly she is rapidly going ahead in tank design, and she is the only nation besides ourselves that is even partially equipped with a modern tank.

America is at the moment more interested in air development and the laying of smoke screens. She has five battalions—Renaults and Mk. VIII's, the latter tank rather similar to our Mk. V, but longer and heavier, and driven by a 330 h.p. Liberty engine. The employment of tanks is still under discussion, but they are definitely a part of the infantry. The allotment visualized is about one platoon with each assaulting battalion. There is no talk of employing tanks in mass, probably because they would not be available in numbers for some considerable time after the outbreak of war. At present the Americans are experimenting with a 15-ton tank which is expected to be a great advance on their present equipment.

Japan has no Tank Corps. She has a few French and British tanks. As a nation the Japs are not mechanically minded—nor is Japan well situated for manufacturing tanks. It must, however, be remembered that there is a popular demand in Japan for the modernising of her army, and though shortness of money will limit their numbers, she will probably be able to put some tanks into the field.

Italy. The military requirements in Italy are seen mainly from the point of view of the defence of her frontier. She does not, except in Tripoli, visualize fighting outside this area. Her frontier runs through the mountains where tanks could not exert a great

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influence. In Tripoli sand is a great deterrent to tanks—experiments are in progress to overcome this difficulty. The Fiat Company have produced a tank for sale to foreign powers. It weighs 40 tons, is heavily armoured (15 to 20 m.m.) but is comparatively slow—about 6 k.m. per hour. The Italian Government however are apparently tending towards a light tank. A 5-ton tank, built by Fiats and capable of about 12 miles per hour across country, has been tried on manœuvres and is a success.

France. I propose, for two reasons, discussing the French tank situation at rather more length. The first reason is that of all military nations the French are the greatest realists, and the second reason is that they are enthusiasts about tanks and armoured cars. At the end of the war the French tank service was a part of the artillery and was equipped with Renaults, Mk. V's and a very heavy 70-ton tank (experimental only). To-day the tanks are a part of the infantry and their equipment is precisely the same as in 1918. That is not to say that they have not experimented. They have. But they are not a wealthy army and though the day cannot be very far distant when they must re-equip they are postponing that day as long as possible. The French situation is extraordinarily interesting They have militarily but one possible antagonist. This enemy lives beyond the Rhine—is at the moment bound hand and foot and though he may have tank designs he cannot produce any in the field for several months after the commencement of hostilities. The French F.S.R. lays tremendous emphasis on fire. They do not pay lip-service alone to this theory that fire is everything. Their battles are definitely limited and organised so that the utmost power can be obtained from all their weapons and they are insistent that a *succès sur* is what is required not a *succès eventuel.* If then we consider first the probable theatre of war, we rule out at once a heavy tank from the French army. It could never get across the Rhine. The French consider the Mk. V. too cumbersome and vulnerable. There then remains the Renault. This tank was designed for trench warfare. It has terrible limitations for the open warfare we all hope for in the next war. It can only travel about 15 miles under its own power every other day, the intermediate day being used for overhaul. To overcome this, Renault tanks are carried in lorries on the road, but here too there are

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difficulties. Such a lorry column requires a road to itself. The lorry is very broad and unless it travels in the centre of the road it is very liable to slide into the ditch. It is, therefore, a good mark for hostile aircraft. That the French realise this is borne out by the fact that they are experimenting with a tank that has wheels for the road and tracks for crossing country. This tank will be a fast one, probably 15 to 20 miles per hour across country and will weigh about 15 tons. If the French went to war to-day, or indeed within the next few years, such a tank would not form part of their equipment. They would have to rely on the Renault.

Bearing in mind the French doctrine of the *succès sur*, what are their tactics likely to be? They are not afraid to use tanks against covering troops. The manœuvres near Coblentz last year made this clear. It seems probable that they will achieve that *succès sur* by employing tanks to drive in the hostile covering troops. During this phase they would not be opposed by very serious anti-tank defence. Having driven in these advanced troops the French tanks would probably be withdrawn to refit while the plans were made for the decisive battle. In the French Army the tanks are not decentralised, they form a part of G.H.Q. reserve. In the battle they will certainly be employed *en masse* and in depth. The fear of hostile anti-tank weapons leads them to fight on very wide frontages. The great majority of the tanks will be used to help to make the infantry successful in the initial assault. The French are no believers in eventualities which may never come. Neither do they agree with the policy that regards the tank as a means of rescue for the infantry. They state definitely that the tanks must lead the attack.

It is curious to consider how far apart our and the French view on anti-tank defence is. We are really worried as to how best to deal with a hostile tank attack. They are far more perturbed as to how to deal with the hostile anti-tank defence in order that their tanks may have a fair chance. Partly this is due to the fact that they are working with a 5 m.p.h. tank, and that they have never suffered and are unlikely in the near future to suffer from a hostile tank attack. As a result of their views there has grown up in the French Army a school who would employ a very large proportion of guns and ammunition for the sole purpose of covering the tanks with smoke. And there is to-day a heated controversy between the

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exponents of smoke and those others who maintain that fire power is everything and that, though smoke may protect from fire power, smoke producing weapons do nothing to create it. In order to combat the enemy anti-tank devices special aeroplanes and artillery are always allotted to tanks in the attack.

I do not think we have very much to learn from the French anti-tank defence. The 75$^{m/m}$ gun in silent positions in between centres of resistance—barrages to shepherd the tanks into areas covered by anti-tank guns—the employment of the 37$^{m/m}$ infantry gun, a weapon of doubtful stopping power—these are their defensive measures. Before leaving the French army I would like to lay emphasis once more on their two great theories :—

(1) Tanks must be used in large numbers and be protected.

(2) It is useless reserving them for eventualities which may never occur.

Russia. As I have already said, in Russia they are taking the greatest interest in tanks. Their view is that tanks and gas are new methods of warfare, and that they are the most efficient ones.—That nobody has great experience in the uses of these weapons and this fact puts a new proletarian army on an equal standing with an old royalist army. Tanks and gas are, they imagine, a short cut to the whole art of war. The Russian Armed Forces Regulations are really excellent. They are very detailed, and the action of tanks independently and with other arms, is very carefully worked out. The Bolshevists legislate for employing independent mechanical forces. These have been already organised and are composed of armoured cars, tanks, aeroplanes and armoured trains. They also advocate strongly the employment of tanks in mass, and in great depth. This must at present be a pious hope, for there are not sufficient tanks available to form a "mass." Their organisation too does not altogether tend to make them available in large numbers. They have two forces, the Field Army and the Og Pu. The latter, which contains a very large proportion of armoured vehicles, is an organisation for keeping everybody, including the field army, in order. No one, except a guaranteed communist, is allowed into the tanks. In one particular the Bolshevist is, I think, ahead of the rest of the world. He is fully alive to the necessity for making

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tanks gas-tight, and has already provided oxygen apparatus for the crews. /

Germany is the only country that has any experience of tank attacks. During the latter months of the war she used more and more of her field artillery as anti-tank weapons, and at the Armistice she had a half-inch machine-gun. She is probably ahead of the rest of the world in anti-tank design. We can say the answer to the tank is another tank. Germany must think of something different. German F.S.R. says a good deal about anti-tank defence. It talks of the necessity for tank barriers both natural and artificial, in front of the position, tank traps, minefields and anti-tank guns. Each infantry battalion will have two pom-poms for use against tanks, and the "S" ammunition of the war has been greatly improved and it is stated that it will penetrate half an inch of armour.

I have gone at considerable length into the design and grand tactics of foreign tanks in order to make the problem, as I see it, clear to you. The three points that appear to stand out are:— (Firstly.) In all armies the trend of design is towards a very fast tank of medium weight, armoured against armour-piercing machine-gun bullets. (Secondly.) Military opinion regards the prospect of a great battle unsupported by tanks in numbers with the utmost repugnance. That is why we husband our resources. (Thirdly.) Even when tanks are used in mass as visualised by the French and Russians, they must be supported and protected by artillery and that means in the majority of cases by a smoke screen.

The Position at Home.

At home we have one tank battalion per division. This battalion at war strength would consist of four companies, each of 16 fighting tanks and one company commander's tank. In addition there will be 5 radio tanks, giving a total of 73 tanks in the battalion. Many people consider this establishment too unweildy, and it is suggested that the establishment should be 3 companies, each 16 tanks, instead of 4 companies. To-day in India there are no tanks. This winter, however, two modified Vickers tanks are being sent out for trial. These tanks differ from the Vickers tank with which the Royal Tank Corps at home is being equipped, in that extra fans are being introduced in order to assist in cooling the tank. The tracks are some-

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what broader and stronger. It appears, however, unlikely that this tank will be accepted by the Indian Government. The conditions in India both on the frontier and for internal security are such as to restrict vehicular movement almost altogether to roads or tracks. No tank yet designed could climb the rocky hills of Waziristan. On the other hand all lines of communication must lead along tracks in valleys. An armoured vehicle operating along these tracks is of the greatest assistance in helping picquets on to a hill and in covering their withdrawal. Up to date this duty has been done by armoured cars.

Recently the tremendous strides made in the half track machine and the Renault multiple wheel have turned military thought in India to these chassis. Experiments will take place shortly with a view to mounting an armoured car turret on one of these half tracks or multiple wheel chassis. Such a chassis would reduce the speed of the armoured car probably to about 25 miles per hour. This is considered adequate for internal security. From the point of view of cheapness the half track or multiple wheel armoured car is about one half the price of a tank, and it would appear to be able to perform the double duty of an armoured car and, within limits, a tank crossing country. For the moment anyhow we could expect no tank reinforcements from India.

The Employment of Tanks.

We have then, in Great Britain a very small proportion of tanks compared with the infantry. For this reason it has been laid down that tanks should not be frittered away on small enterprises, but should be reserved for the decisive battles. It is further the doctrine that tanks are to be employed in close co-operation with the infantry. In general it may be said that the infantry push on till they meet serious opposition, tanks are then called up and a set piece battle is arranged. These tactics are consequent on the scarcity of tanks per division. I should like you to consider for a moment the difficulties into which this shortage of tanks is likely to lead us. In doing so I want to make it perfectly clear that I am now giving my own ideas, they are in no sense official views. The policy laid down for the employment of tanks is that I have just stated, i.e., that the infantry push on till they meet serious opposi-

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tion and that tanks are reserved for the decisive battle. Consider first, then, what serious opposition consists of. Is a machine gun nest serious opposition? In certain conditions may not even a couple of machine guns be very serious. In the advance to the Aisne in 1914, German rearguards having a very small proportion of machine guns caused tremendous delays. Those same rearguards to-day would bristle with machine guns. How are they to be driven in? We cannot spare the tanks. It will mean, of course, that a division—possibly a whole corps—will have to deploy before these rearguards can be forced to retire. And the delay thus caused must be the most tremendous concern to the commander. The enemy rearguard will find it very easy to carry out its principal rôle of gaining time for its main body. Will not our commander be very tempted to push in some of his tanks to clear up the situation rather than wait for the infantry? If he does not do so, the enemy may escape and then he will be left with his tanks intact but no enemy to destroy. And if the enemy uses tanks to strike a blow against our advanced guards? It appears to me that we will then be forced to counter with the best weapon we have got—our own tanks.

There is another reason which leads me to suppose that our very small establishment of tanks will not be in existence on the day of the great battle. That reason is the psychology of the average commander. We all know that if you deploy an infantry brigade against a position held by two or three companies of motor machine guns and a battalion of infantry, even if the brigade is supported by the whole of the divisional artillery, it will suffer very heavy casualties. This same little operation could be carried out probably by one company of tanks with very small casualties to itself and practically none among the supporting infantry. No commander likes losing men's lives. All commanders purchase victory as cheaply as possible, and to-day the cheapest method is to employ fast tanks behind a smoke screen. Will not the commander be forced to use a proportion of his tanks to drive in the enemy's advanced troops rather than expend his infantry? But if we use tanks, the enemy will reply with tanks. He may in any case use them. If he does employ tanks, then our tanks must engage and drive off the hostile tanks, for until this has been accomplished

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there is no safety for the attacking infantry nor for the tanks themselves. This tank battle will be a pretty sanguinary affair, even for the winner, and the loser will find it hard to make a safe retreat. The opportunity of completely destroying the enemy's tanks will be too good to be missed. Whichever side gains the victory in the battle will allow no respite to the adversary. The pursuit must be continued till there are no more tanks to destroy. Then the victor himself will be in such a state mechanically, that he will require a very considerable period to refit. His crews will be tired out, and of course he will have suffered heavy casualties. If there are no more tanks in reserve, the great battle will be fought, as in October, 1918, with no tanks on one side, and a few tired ones on the other. It might be said that this points a moral—that some tanks should always be kept in reserve. A reserve is an excellent thing, but it is only when it is used that it wins a battle. It is no use keeping one third of your tanks in G.H.Q. reserve and allowing the enemy to mop up the other two-thirds. With a large proportion of tanks a reserve would be possible—the fewer the tanks the harder they will be worked and the smaller the reserve must become.

I am not attempting to paint a wild picture of great tank v. tank battles. This sort of battle is already with us, for in 1918 tanks were fighting other tanks. I am trying to picture to you the problem in its many aspects. Undoubtedly one aspect is this break through by one side or another with large numbers of tanks and the ensuing tank battle. This battle may, and probably will, decide the fate of the campaign. You will come into it. Your rôle will be an amazingly difficult one. You will have to assist in knocking out tanks moving at high speeds, in great numbers, and after a very few minutes they may be attacking you from any quarter of the compass. Anti-aircraft gunnery will be child's play to it, because you will not be immune. Every tank will be spraying the countryside with machine gun bullets. I think I have said enough to show you why we think our present establishment of tanks inadequate. Our tactics are restricted by this inadequacy, and the picture of tank attacks presented to you at manœuvres is not necessarily a true one.

The Independent Mechanical Force.

There is one aspect of the employment of tanks which I have not alluded to—it makes your problem more difficult still. The

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French have organised, anyway on paper, a Mechanical Division. A formation tremendously powerful—able to maintain itself and, if let loose round the flanks of an army or through that "g" in gap which we were chasing most of the war, would completely upset our domestic arrangements behind the line. There is, and will be for many years, controversy as to whether it is possible for a tank unit, say a battalion, to act on its own with success. Mechanically the present Vickers tank could so operate. There were cases in the war, notably a Whippet known as Musical Box, which lived for one epoch-making day—8th August, 1918—and which cruised about behind the enemy's lines knocking out batteries, destroying transport, frightening corps headquarters and causing that strategical paralysis which an eminent officer, late of the Tank Corps, advocates as the principal objective. This tank fought, like the *Revenge*, alone, and it was not till it had practically used up all its oil and petrol that it received a direct hit and its usefulness came to an end. It is not inconceivable that this situation will occur again, and that not one but 100 tanks will cruise through the billets; that Corps Headquarters will shout for protection and Armies will order the battle to stop because second lieutenant James Pigg has led his tanks as straight as he used to ride to hounds.

Tank Troubles.

There is, however, another side to the picture. The tank has great difficulties to contend with. If you build a battleship there is lots of room inside for big guns and admirals' cabins. A submarine, on the other hand, leaves much to be desired in the way of sleeping accommodation. A tank is as much more confined than a submarine as the latter is than a battleship. In battle after the tank has been filled with various sorts of ammunition, drinking water, rations, odd flags and innumerable other impedimenta, a crew of five has to be accommodated. Each one of these five has his part to play in the fight but only one of them, the driver, can get a view that by the utmost stretch of imagination can be called adequate. Even the driver is not too well off in this respect. If the tank is in action the top will be closed down and the driver can only see through a series of small loop holes. The layer spends his time

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between attempting to balance himself and examining the country. His view is obtained through the sight aperture and as it is of vital importance that he should engage any anti-tank guns that open fire on him, he must keep on traversing his gun so that he may examine the country on all sides. This means, of course, that the remaining members of the crew must spend their time getting out of his way. When the top is closed down the heat inside becomes rapidly tropical. There is always an unpleasant smell, and the motion after some little time tends to make you seasick. Added to these discomforts there is the splash of the bullets. No matter how much you close down a tank there must be some small holes. Through these a bullet will not penetrate but at certain angles a bullet will "splash" through and will cause very unpleasant cuts. These cuts may not be severe enough to put a man out of action at the time, but they bleed very freely. The armour on the older makes of tanks used to flake, that is to say—sometimes when a rifle bullet struck the side a piece of metal flaked off the inside wounding anyone it struck. It is hoped that this flaking will not take place so much in the new tank.

Anti-Tank.

I have now led you, by devious paths to our problem—I have shown you the tank's weakness and its power. And though the discomforts are very apparent to its crew, to those it is bearing down upon it seems an apparently invulnerable monster, and it is hard to realise that all the crew may be bleeding from the face and seasick.

Often you will hear at a conference after a field day that one or two or even more tanks were judged to have been knocked out, and you go away feeling somewhat re-assured. But how many tanks must you destroy before you can definitely say you have stopped the enemy? If an infantry battalion has 30% casualties, it will not be stopped from attaining its objectives. Good battalions will suffer a far higher percentage and still continue to advance. In the war, time and again only one tank in four reached the objective. The tank is so engaged fighting its own battle that it has very little time to watch what is happening to its comrades. So that your problem is to knock out not one but many tanks, and that pretty quickly. For if you allow your front-line infantry

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to be over-run they won't have much moral left. Anti-tank weapons must, therefore, be sited in depth and must cover the front edge of the defensive position. Many times during this lecture have I alluded to smoke. All armies regard it with favour, some say that no tank attack can take place to-day without it. You must expect, then, that your anti-tank weapons will be blinded by smoke. That you may first see your target when it is less than 400 yards away and is letting off streams of lead in your direction. On good going that 400 yards will be covered in something under 60 seconds, and if you destroy it, remember tanks work in sections and your job is but begun.

You have to assist you in your task obstacles both natural and artificial. Inundations, cuttings and sunken roads—rivers and lakes, dense woods—marshes—minefields—tank traps. All these artificial obstacles require considerable time to prepare. It is popular, at the moment, to talk of siting positions covered by big natural obstacles—a plan that is strongly reminiscent of General Dawdell's advice to those selecting a position. He said each flank should rest on the sea and in front there should be an impassable obstacle. War isn't like that, the other fellow always seems to have the best obstacles in front of him, as well as the best O.P's. But if you can find an obstacle even along a portion of your front, accept it gladly and concentrate your gun defence elsewhere. Let us sum up your difficulties. You may expect to be attacked by large numbers of fast moving tanks who will be supported by smoke. They may appear on your front or flanks, they may even appear suddenly far in your rear. It is certain that they will attack you at their own selected time and place. If they get into your position for any length of time they will ruin the moral of your troops. Allow them even half an hour's free run and they may penetrate four or five miles. Can you be strong everywhere? Obviously not. If you increase your anti-tank weapons enormously it must be at the expense of some other arm, and it is only by enormous numbers of weapons that you can ensure strength—for they must be sited in depth—able to protect the front edge of the position equally with the rear edge—they must be in sufficient numbers so that if some are knocked out the defence may still hold. They must be sited to guard railheads and important centres in rear.

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It is obvious that the "strong everywhere" theory won't work. There is only one way to meet speed and mobility, that is by at least equal speed and mobility. If your defence weapons are sufficiently mobile they can be concentrated for the defence of the threatened point. If they are merely guns in position on the ground the battle will be over before they can be concentrated. The anti-tank gun defence to-day is not adequate. The 3·7″ How. does not meet the case. Nor does the 18 pdr. Given time the latter will knock out some tanks but "some tanks" is not enough. A machine gun firing ½-inch bullets will eventually stop a tank. The hose method of hitting a target is far the easiest provided you can see the business end of the stream. It would appear then that an improved pom-pom might give the desired results, but only if it is sufficiently mobile so that it can be concentrated very rapidly wherever it is needed. To obtain this mobility the pom-pom would have to be mounted on tracks and would become in fact a tank.

Conclusion.

In conclusion I would ask you not to go away with the idea that I consider the pom-pom or any other weapon in themselves the complete answer to tanks. There is an answer to the Problem of the Tank as there is an answer to all other military problems. The answer does not lie in pieces of metal—not in obstacles natural or artificial. Ludendorff in 1918 said "It is fire which is decisive, not numbers," and he lost the war, not because he hadn't abundance of fire power, but because his men would not fight our tanks. That is the answer. We must fight, and if we want our men to fight we must give them such a weapon as makes fighting possible.

(Applause.)

After Lt.-Col. Pile had concluded, many questions of detail were asked and replied to, after which the chairman asked Maj.-Genl. J. R. E. Charles to make some remarks.

Genl. Charles spoke as follows:—

GENERAL CHARLES: This is a subject on which, as the lecturer said, we are all very ignorant. I think we are rather apt to be misled by our experience of victory in 1918 when we were dealing

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with an enemy who had no tanks, whose moral had sunk to a very low level, and who certainly put up a very poor resistance in the last couple months of the war. Our tanks went into action with the practical certainty of doing what they wanted to do and when there was nothing very much up against them. That is not going to be the situation in the next war at the beginning, any more than our position as artillery is going to be what it was in the way of gun resources at the end of 1918. So that we have rather got to clear our minds of the idea that the tanks are going to have it all their own way.

Dealing first of all with the question of tank attack, I personally have had very little opportunity since the war of seeing any training in this direction, but I was down at the Aldershot training last Summer, and the first thing that struck me was that with our extraordinarily inadequate resources in tanks—which after all will only amount at the end of next year to possibly 200 tanks in the whole of the British Army—you will not be able to afford to give your tanks unlimited objectives. One or two fortunate tank commanders may be able to burst through and may succeed in getting to the enemy's divisional and corps headquarters, and, we will hope, do them in. But the thing that struck me most of all, watching as a spectator, was that the tanks were very much thicker on the ground than they ever will be in a big battle, so that after the first initial success which they are absolutely bound to have if they are fought in any intelligent way at all, the state of disorganisation amongst the tanks will become extraordinary. And the reason is not far to seek, because it is a very pertinent question: What is the method of controlling the section by the section commander? The answer is that when they are in motion he has no power at all. He has to give his objective and they have to go for it. What we have been doing in our tank training, as far as I know, is giving limited objectives and orders for rallying. It is not a bit of good letting them off into the blue and saying: "Take that line and then go on." It resolves itself into a series of battles with individual tanks. There has got to be far more control than we have had. With the very limited number of tanks available, my own personal opinion is that you must not give your tanks at the beginning of the battle an objective which will take you anywhere

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near the enemy's gun lines. Personally I have very great faith in the gun against the tank and I think the experience on the Somme rather supports that. One very brave and intelligent German subaltern practically held up the tank attack on a big portion of that field, and that is what will happen in the next battle if you let your tanks off into the blue without giving them very definite objectives. Then on the other side of the question is anti-tank defence. We are very far from that now. The attempts we are making now in our Army to deal with it are limited to two things: One is the gun, and the other is the holding of anti-tank localities. A small larch plantation is the place that a tank practically cannot get into, and if you can hide your infantry or whatever you have got, away from the edge, the limited view the gunner gets from the inside of the tank will practically make the tank valueless, as the tank cannot penetrate amongst trees or marshy ground. Indeed a very small ditch will make a man pull up and drive slowly, and there is the enemy's opportunity.

But we have to disperse our artillery much too much in order to provide for our defence against tanks. The problem is how to place artillery economically and at the same time to give a certain amount of force by having a number of anti-tank guns pushed well up. With our rather inadequate resources in guns, by the time the howl of the Brigadiers to give them a sufficient anti-tank defence is met there will not be enough left behind for the real problems the artillery has to meet. Those are the two problems you have to think about.

THE CHAIRMAN: Gentlemen, I think it only remains for me to ask you to thank Lieut-Col. Pile for his lecture, and General Charles for the remarks he has made. (Applause.)

(The proceedings then terminated.)

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THE ROLE OF FORWARD TROOPS IN THE COLLECTION OF INTELLIGENCE IN THE FIELD.

A Lecture delivered at the Royal Artillery Institution, Woolwich, on Tuesday, 9th December, 1924,

By Major-General Sir William Thwaites, K.C.M.G., C.B.

Major-General Sir H. W. Hodgson, K.C.M.G., C.B., C.V.O., in the Chair.

Major-General Sir H. W. Hodgson: Gentlemen, I have to introduce to you Major-General Sir William Thwaites, who is going to lecture on "The rôle of forward troops in the collection of intelligence in the field."

Major-General Sir William Thwaites: Gentlemen, what I am going to talk to you about this afternoon is the subject of a lecture that was prepared by me in 1922 for the Senior Officers' Course and was written entirely for Regimental officers. It is based on the material that we collected from all over the world for the compilation of the Manual of Intelligence in the Field, which is now in your office libraries; it is a confidential book and is worthy of study.

It is written in this Manual, Section 19, page 31:—

"Whilst it cannot be said that any one source of information is invariably better than another, it can be definitely stated that the bulk of the responsibility for collecting information falls upon the troops in contact with the enemy," and, further, that "An efficient intelligence is dependent on the efforts of fighting troops."

Again, in Section 107, page 109, it says:—"The importance of the rôle that should be played by fighting troops in every intelligence system cannot be too strongly impressed upon all ranks."

And for the third time, Section 116, page 116: "In war the bulk of all intelligence is, or should be, obtained by fighting troops."

Thus so much importance do we place on the responsibility of

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the troops in immediate contact with the enemy for helping the intelligence personnel of the Army that we go to the trouble in the book of mentioning it three times.

The average junior regimental officer and the rank and file are prone, I think, to shroud the Intelligence Section of the General Staff in an atmosphere of mystery. The expression "Intelligence" brings to their minds visions of mysterious people poking and peeping about for information, working with the subtle methods of secret service agents, carrying their lives in their hands and pistols in their pockets, and embodying all the good or bad characteristics of the hero or villain of a Le Queux novel. The green tabbed officials of the Intelligence Corps in the recent war, were at first regarded with the utmost suspicion. The reserve of the green tabbed official was very marked and he had an insatiable curiosity, a combination of characteristics which the average Britisher resents, and this rather led the soldier to imagine that his ramifications were not so much directed towards gleaning information about the enemy as about the state of the unit that he visited, and the individual was consequently looked upon at first as suspect. Gradually this feeling wore off, when it was found that the visitor often supplied interesting tit-bits of news and that the information given to him became reflected in Intelligence Summaries which reached the troops, and, again, in subsequent successful operations in the field. In fact, it eventually became obvious to officers and men that they themselves were the means of providing most of the valuable information on which Commanders were able to base their plans. I am quite prepared to state that the information supplied by the troops themselves for the construction of the "order of battle" is of such first-class importance that commanders rely upon it to a degree which cannot be exaggerated. I purpose, therefore, in the course of my remarks to lay before you, as far as possible, the various methods by which the forward troops are able to obtain their information and to illustrate them by incidents which actually happened in the various theatres in the Great War. It is not my intention to go exhaustively into the intelligence organization, which is very clearly dealt with in the Manual. I would however like to lay very strong emphasis on this point, namely, that the

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Intelligence Section of the General Staff is complementary to the Operations Section, the former being responsible for appreciating the plans of the enemy, whilst the latter draws up plans for our own operations based on what the intelligence section produces. Consequently, since the intelligence section pins its faith largely on what it gleans from the forward troops, you must see what responsibilities are thrown on regimental personnel to help to bring about success in war.

I have advisedly used the expression "forward troops," or "troops in contact with the enemy," and have avoided the term "first line troops." The latter term savours too much of trench warfare, and we want to train our thoughts away from trench warfare and to think in terms of war of movement and manœuvre in all our future training. Trench warfare, as far as we are concerned, is to be hoped dead. Whether the situation is one of trench or of moving warfare, the opportunities offered to the fighting troops to obtain identification do not widely differ. The basis of all plans of operation is the hostile "order of battle," and this, as a campaign proceeds, is never quite a constant factor, more especially if operations are protracted and attenuating. The responsibility of producing an accurate "order of battle" of the enemy at the outset of war lies with the Directorate of Military Intelligence, War Office. This information is derived from all available sources in times of peace, as regards the distribution of his troops and the plans of mobilisation. For instance, in 1914, a pretty accurate estimate of the composition of the seven armies with which Germany started the war was made by the General Staff and issued to the troops, at any rate as regards the placing of units and formations of the active or regular German Army. The number of reserve formations was known, but their composition was not quite understood. It had been calculated by our General Staff in 1910 that Germany could put 119 divisions into the field at the outset of war, and the actual number she did put in then was 121, so that the information of the General Staff was not very far wrong. At the time of the Armistice, in 1918, this number was nearly doubled, and there were 217 divisions on all fronts, of which 186 were on the Western Front.

Another point in connection with the "order of battle'

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which is of very high importance is to know who are the leaders and what is their psychology. A pamphlet on the characteristics of the German leaders was issued by the General Staff in 1914 for the information of G.H.Q. I do not think it ever went beyond G.H.Q. For instance it was known that von Kluck was to command the First Army, and he was described by an officer who had served as British military attaché at Berlin, as being "a fine soldier of bourgeois origin and ennobled by the Kaiser. Little loved at court on account of his origin and rough manners; little loved by his subordinates on account of his severity, but esteemed for uprightness of character as a disciplinarian and for his military skill." Again, von Heeringen, who commanded the Seventh Army, was described by the same officer as being "an old man lacking in energy, to be included in the category of people who have had 'greatness thrust upon them.' His 63 years of life do not sit very easily upon him." I mention the question of leaders because whenever the identification of troops leads to the location of any particular formation, from division to army, the name of the leader must become known (the German soldiers had a habit of always writing down in their diaries the names of their leaders) and on the knowledge of his personality and favoured tactics a successful plan of operations may depend. I have purposely quoted the two flank German commanders who led the initial onset, because as a matter of fact the 1st Army on the right had the greatest task, and the 7th, the pivot on the left, the least. Naturally the German Great General Staff allotted its leaders accordingly, and put von Kluck on the right and von Heeringen on the left, which was quite reasonable. Now the responsibility for enabling the "order of battle" to be kept up to date, once operations have commenced, lies, I may say, almost entirely with the forward troops. They submit the reports of patrols and fighting formations; they carry out the close reconnaissance and observation; they collect the prisoners and deserters, and they capture documents and war material, from all of which sources most of the information required is derived. Secret agents, air observation and photography, and intercepted wireless help to complete the missing links in the chain.

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You can imagine how interesting it was in the War Office and at G.H.Q. to trace the movements of a hostile division during trench warfare from one part of the Western front to another. First of all a report from G.H.Q. to the War Office to say a certain division had been relieved, the knowledge having been derived by our own troops taking prisoners from the new formation or reporting on new battle tactics. Then a report from the War Office to G.H.Q. telling that the particular division being watched had been reported from sources on the Continent moving north or south or east by train. Finally a report from G.H.Q. that the same division had been identified by contact with forward troops in another part of the line. By following such movements, those portions of the line which were being held on wide and shallow fronts by indifferent or exhausted formations, and other parts on narrow fronts in depth by good and fresh troops, could be identified, and so the possible direction of premeditated attack could be appreciated and our own leaders enabled to frame their plans accordingly.

As regards regimental responsibilities, the most important matter in connection with feeding the Intelligence Section of the General Staff with information from the front is that it should be passed with the utmost despatch and, however trivial, should be accurately reported. The source and reliability should be stated, and what is really wanted from the fighting troops are facts and not deductions—the deductions are made by other people. The tactical situation is so kaleidescopic—less so perhaps in static than in moving warfare—that information rapidly gets out of date. It is essential therefore for the intelligence section to get it as nearly as possible at "white heat." The chain of transmission is through the unit scout officer or leader, and forward observation officer of artillery, to the brigade intelligence officer and thence to the G.S.O. 3, for intelligence of the division. It is very important that everybody in the division should know who the G.S.O. 3 is and what he is like, and it is up to him to make himself known to the troops. In order to do this he must be constantly with the forward troops and must conduct himself in such a way as to ensure a welcome, otherwise he will get no information or assistance. His intelligence corps officers must also be equally familiar and ingratiating.

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First in logical sequence of the ramifications by the forward troops come ground reconnaissance and observation. It is customary to allot zones for the execution of these tasks, the responsibility for which lies with the unit scouts or with brigade, divisional or corps scout groups when formed, every unit and formation being responsible for its own front and for an overlap on its flanks in order to allow no ground to be unwatched. These zones lie parallel in depth. The first or most forward zone, with which the fighting troops are concerned, embraces the area occupied by the hostile forward troops, that is to say, his main battle position. This zone is watched by battalion and brigade scouts, and forward observation officers of artillery. The second zone extends roughly to the extreme range of our field artillery and is watched by divisional scouts. The third zone, observed by corps scouts, corresponds to that covered by our heavy guns. Ground further back than this is dealt with by balloons and aeroplanes. The picture as it presents itself to you may reflect trench warfare, when observation is comparatively simplified by the static conditions. But the system applies equally to moving warfare, especially in undulating and hilly country, when opportunities exist for scout groups of higher formations to push on behind the fighting troops to good view points.

You all know the importance of the training of scouts or patrols in the artillery. Their efficiency depends on the skill and personality of the scout officer or leader, not yet allowed for in War Establishments, and the selection of the personnel. An eye for country, and highly developed powers of observation are essential, combined with intimacy with map reading and skilful use of field glasses, telescope and the compass. I have referred to scout groups of the brigade, division and corps. The formation of these depends very much on the country you are working in, that is to say, on good view points behind the fighting troops. In a flat country like Mesopotamia visual observation was very often difficult enough with the forward troops—from further back it was impossible. These groups are therefore only formed as and when a useful purpose is served. In static warfare they are as a rule essential. The brigade scout group is organised by robbing the battalions of selected scouts and consequently by upsetting the equanimity of commanding officers

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scout officers and company commanders. No definite establishment can be laid down—the circumstances must decide. Possibly up to 12 non-commissioned officers and men may be required. Toll is again taken from brigades and of course battalions are the main sufferers, for the formation of divisional scout groups. Here again from 10 to 12 men may be required. The feelings of the commanding officer towards the brigade, in this matter, are incomparable with his feelings towards the division, and the brigadier in his fatherly capacity towards his children, the battalions, has been known to verge on the insubordinate. I know it to my regret as a divisional commander and to my cost as a brigade commander. The corps draws its scout groups from a special organisation of Intelligence Corps personnel formed at G.H.Q., so here the liabilities of the fighting troops cease.

Now as regards the sort of information demanded from scout organisations. On the same principle that contact with the enemy once obtained must be maintained at all costs, observation by scouts must be continuous to be of value, and they must work in close co-operation with artillery observers. It is all part of a game where the best trained and organised side wins. Battalion scouts glean information on a multitude of matters. Topography, positions of machine gun groups, trench mortar positions, state of wire and hostile defences, patrol tracks, reliefs, ammunition dumps, positions of batteries and their activity, presence of gas arrangements, hostile methods of communication by rockets and flares, general habits of the enemy, and numberless other questions which will occur to you. The functions of the brigade scout group supplement those of the battalion scouts and in the stress of battle, when the battalion system is sometimes difficult to maintain, may take its place entirely. The functions of divisional and corps scout organisations are to keep approaches and back areas under observation. I have touched very lightly on all this, because it is dealt with in such great detail in the Manual, in F.S.R. and the cavalry, artillery and infantry training manuals, but I again lay emphasis on the point that the results of observation by the forward troops are a most important link in the whole fabric of a good intelligence system.

I have here two fairly good instances of the results of good infantry observation.

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The first is in static warfare. In September, 1917, we were attacking just north of Flers. Infantry observers had previously reported movement around a dugout in Tilloy Wood, which appeared to be the arrival and departure point of officers and runners. The dugout was considered to be a regimental headquarters (corresponding to our infantry brigade), and during the next attack was bombarded by medium howitzers. It was afterwards ascertained from prisoners that this was actually regimental headquarters, which had been completely neutralised during the attack, and unable even to issue orders to the battalion in reserve to counter-attack. The three battalions had had to fight without orders or co-ordination from above.

We get an instance in moving warfare in November, 1918, when the 22nd Corps was attacking eastwards south of Valenciennes. Infantry observers reported what they thought to be four German tanks, moving across some high ground about 8 miles behind the German battle line. This was taken to indicate an intention to counter-attack and our infantry were issued at once with a selection of German anti-tank rifles which had been collected on the battlefield. The next day the Germans did counter-attack, led by four British Mark IV tanks, which had been captured on the Somme in March, 1918. Two of these were knocked out by our artillery, who had been warned to expect them; and the other two were neutralized by the German anti-tank rifles manned by British infantry.

Now it is of first importance when fighting is not in progress and a condition of comparative inaction exists, that forward troops should strain every nerve to maintain contact with the enemy, whether it is the advanced cavalry during an approach march, whether it is the outposts before battle is joined, or whether it is the front line system in static warfare. Time spent in searching for information is time well spent, and every item of information is important, whether it appears of small value, or whether it is negative or positive. The links of the whole chain are put together at G.H.Q., and the most trivial matter, as viewed by the troops who report it, may turn out to be the essential that completes the picture. The secret of success is that you must go and get your information. You have got to be inquisitive. In the early part of 1915 when we

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had really sat down to trench warfare, raiding and useful patrolling had not been reduced to a fine art. Commanders were thirsting for information, and the troops, driven to desperation by insistence from above, followed the policy of any port in a storm. For instance, on the 8th Division front, south of Armentieres, quite early in 1915, the presence of the 57th Regiment had been constantly reported for a fortnight or more. This was always supported by evidence—a cap at one time, then a pair of shoulder cords, then a small book, and so forth. One day the G.S.O. 1 was in the front line—he was inquisitive—looking over the parapet, he saw a more or less naked dead Boche of some 14 days' antiquity lying in No-man's land. He suggested to the platoon commander that it would be a good thing to bury him. "I'll see what I can do" said the boy, "but I'm afraid it will be very difficult, because you see that is our identification!"

It is obvious to everybody that the information of greatest value to the Intelligence Section of the General Staff is that derived from the interrogation of prisoners and deserters, and the documents found on them. Also from the inhabitants of occupied territory. It is only by the activities of the fighting troops that these can be obtained. The scrutiny of these sources is the ultimate duty of the G.S.O. 2 for intelligence of the corps, when such a formation exists. I say this because in small wars, when an expeditionary force of not more than two or three divisions may be employed, this duty will probably devolve on divisional intelligence personnel. And since we were told by politicians in 1919 that a major war on the continent was not likely to take place for 10 years—I do not know why that was so, except that it was thought that the disarming of Germany would put her back for that period—we may take the small war basis as the normal. It is not, however, the duty of the forward troops to elicit anything more out of prisoners and deserters than such tactical information as affects them and their formations immediately. Consequently prisoners must be forwarded with the utmost despatch to divisional headquarters, where the G.S.O. 3 will carry out the primary or, if there is no corps, the main interrogation. The responsibility of the troops lies in the immediate report to divisional headquarters of the number of prisoners or deserters captured, the units to which they belong and

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the front from which they were obtained. Arms and ammunition are removed from them, and documents must be collected and tied up in packets belonging to each individual, either at battalion or brigade headquarters, generally the latter, and forwarded with the prisoners. The weakest possible escort is to be provided. We lay down in the Manual that the escort should never exceed 10 per cent. of the prisoners in each batch. Humane principles demand the sending back of all prisoners. Single prisoners are not always reliable in their statements; in fact they are so rarely reliable that confirmatory evidence of others is essential. The custom of "mislaying" prisoners in transit from front to rear is to be deprecated. I have sometimes had a report that a patrol or raid had captured two or three prisoners, and only one turned up, the excuse from the escort in charge being "Beg pardon, sir, but the others got mislaid."

Apart from actual fighting, prisoners result from patrolling and raiding. Such adventures are not confined to trench warfare. In the outpost line in open operations plenty of opportunities occur and the activities of cavalry and armoured cars are always productive. Get out of your mind that a raid is only connected with trench warfare. Mark the cavalry raids of Stuart and Ashby in the American Civil War and Gourko over the Balkans in 1877. One of the most interesting cavalry raids of modern times was that of Mamontoff in August, 1919, with Deniken's cavalry in South Russia. He defeated and broke through the Bolsheviks with a Don Cossack cavalry corps at Makarovo and penetrated 25 miles north. He destroyed the Bolshevik supply depot at Tambov, took 13,000 prisoners, repatriated 20,000 forcibly conscripted armed peasants to their homes, added the equivalent of two infantry divisions to his force during the raid from hastily enlisted White Russians, and collected a vast amount of information. He was away 35 days in all, and the effects of the whole adventure would have been far-reaching had not the raid degenerated into a looting expedition of the first magnitude.

There are of course numberless examples of information of the first importance derived from the interrogation of prisoners and deserters. The most interesting case is the way in which the date of attack of the 21st March, 1918, became known. It

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is rather a long story, but I must ask you to bear with me. On the 16th of February, 1918, General Headquarters published in an intelligence summary as follows:—"Although the number of divisions has been increased from 174 to 178, there are no indications at present that an attack on a large scale is imminent on any part of the Western front. There have been various rumours as to dates, several of which have already been disproved. The balance of evidence points to March." The first definite indication of the front of attack was supplied by a document dated 15th February, 1918, captured about the 20th, ordering detailed photographic reconnaissances of the Bullecourt-Moeuvres sector and of the area in the German lines in rear of this sector. The enemy's wireless also showed special activity between groups in the Scarpe—Bellicourt sector, and new groups were located south of Cambrai. On the 23rd February, 1918, G.H.Q. again said in an intelligence summary: "On the British front, the enemy appears still to regard the sector between the sea and Lille as purely defensive. There are no signs of preparations for an imminent offensive, nor have prisoners any knowledge of a coming offensive in this area. Prisoners have also stated that it is common talk that an offensive would take place in the Cambrai area early in March. There are no signs that the enemy's offensive is to be launched immediately, but all indications point to the enemy's intention to have his units at full strength early in March." On the 17th March—we are getting nearer the time now—G.H.Q. "I" said: "As regards the rest of the British front, there is no reason to alter the view already expressed that an offensive is intended in the Arras—St. Quentin sector, combined with a subsidiary attack in the Bois Grenier—Neuve Chapelle sector. Nor is there any reason to alter the opinion that the main attack on the French front will be delivered in the Aisne—Suippe sector. There are not sufficient indications at present to forecast the date of the enemy's attack, and any attempt to do so on the information now available is unsound. The continued reinforcement, however, of the enemy's troops in the western theatre by infantry divisions and artillery from the east, and the constant increase of ammunition dumps and aeroplane accommodation on the Arras—St. Quentin front, combined with

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repeated changes in the enemy's wireless call-signs and codes, are definite indications that the Germans are completing their preparations for attack. The final warning will almost certainly be a short one. Up to the present, it has not been given, and, although we must be prepared for an attack at short notice, there is no reason to expect an offensive from day to day." That was issued on the 17th of March, four days before the attack actually took place.

Now we come to the interesting points with which the front line troops were mostly concerned. On the 19th March, G.H.Q. were told that on the 18th March 5th Army had captured :—

(1) A non-commissioned officer of the 28th Foot Artillery Regiment, who gave the allotment of shell to each battery and said attack was to begin in from two to three days' time preceded by an intense bombardment lasting 10 hours.

(2) A non-commissioned officer pilot aviator, who was certain attack would be made on either 20th or 21st.

(3) Four prisoners of 227th Reserve Infantry Regiment, 107th Division, who were expecting to be relieved by attacking troops. One prisoner said attack was fixed for 20th March.

Finally on the night 18th—19th March two Alsatian deserters of the 414th Trench Mortar Company surrendered south of St. Quentin (Pire Alley) and said a raid was to be carried out on the night 19th—20th March and the great attack on the 20th—21st March, which would be preceded by a gas bombardment. The Alsatian prisoners were the people who gave us the information but it was pretty close to the time, and you know what happened. Now all this would appear to be as much as Ludendorff himself knew at the time. There is a short extract I would like to read to you from his "My War Memories—1914-1918," Volume II, pages 596-598. He says: "At noon on the 20th" (that was the day before the attack) "G.H.Q." (that is German G.H.Q.) "had to face the great decision whether the attack was to commence on the 21st or to be put off. And yet our artillery relied on gas for its effect, and that was dependent on the direction and strength of the wind. I had to rely on the forecast submitted to me at 11 a.m. by my meteorologist, Lieutenant Dr. Schmaus. Up till the morning of the 20th strength and direction were by no means favourable; indeed it seemed almost

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necessary to put off the attack. That would have been very hard to do. So I was very anxious to see what sort of report I should get. It was not strikingly favourable, but it did indicate that the attack was possible. At 12 noon the Army Groups were told that the programme would be carried out. Now it could no longer be stopped. Everything must run its course. On the 21st, just before 4 a.m. (5 a.m. British time) the battle began with a tremendous crash on a front of 70 kilometres, between Croisilles and La Fere. A little before 9 a.m. (10 a.m. British time) our infantry advanced to the assault." I thought these extracts would interest you, and show you what was known on our side and what was known on the German side as regards the possibilities of this attack which took place on the 21st March, 1918.

Now we have other instances. Two prisoners who betrayed the German offensive on the Aisne on the 27th May, 1918, were captured early on the 26th May in the Courteçon area by the 22nd Division. This is rather an interesting extract. The prisoners belonged to the same "Jäger" regiment, but to two different battalions. One was a private soldier the other an aspirant officer. They were sent to the headquarters of the division. The private soldier spoke of an intention to attack. The aspirant officer said there was going to be no attack. The examination was not carried further, and the two prisoners were sent by motor to corps headquarters, where the head of the corps intelligence and the army interpreter were present. The examination began at 1.30 p.m. The aspirant officer was interrogated first. He showed himself quite ready to talk and stated that the Germans had no offensive intentions in his sector. The private soldier came next. He said that the men believed that they were going to attack that night or the following night; he could not be quite sure of the date. Questioned more closely, he said that ammunition and hand grenades had already been issued, but that their battle equipment had not yet been made up. The previous day he had seen soldiers belonging to Guard regiments. He knew nothing more, having been a long time in the line. The aspirant officer was recalled. He was reminded that the customs of war did not force him to speak under any condition, but that he had made statements and that he would bear the responsibility for them.

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It was an act of espionage to give false information. He was palpably disconcerted. The point was insisted on, and he ended by giving the most complete details of the attack for next day. About 3 p.m. warning was given to the higher command through the intelligence section. So there you get an instance of the necessity for having two people, one to confirm the statement of the other, or to be forced into telling the truth.

Now we get an instance of identification from the other side: how the Germans discovered something, or rather, how they were bluffed. This was the famous bluff we put up with regard to the move of the Canadian Corps from the First to the Fourth Corps front to join in the operations to disengage the Amiens—Breteuil Railway, which commenced on the 8th August, 1918, and the action taken led to the complete mystification of the Germans as to the front of attack. The Canadians always worked as a Corps; they were very earnest fighters, and the Germans watched them very closely. So we shall see that the Germans thought by the identification they secured that this attack was going to take place in Flanders. The following general instructions for the operations were issued by G.H.Q. on the 27th July, 1918, at a conference of army commanders, to be communicated to nobody except Major-Generals General Staff of Armies:—"Secrecy is of the utmost importance. The movement of all troops, especially the location of the Canadian Corps, must be concealed. The Second Army will insert two Canadian battalions in the line of the Kemmel Front as soon as possible after their arrival in the army area. These battalions will be put into the line on adjacent sectors. They will be ordered to prepare the front for attack pending the arrival of the remainder of the Canadian Corps. The Second Army will also arrange to place Canadian divisional and tank wireless sets behind the Kemmel front, and will arrange to operate the latter"—so as to get these methods of communication at full blast in order to mystify the Germans. Orders were issued on the 28th July over the telephone by "Q" Canadian Corps for 2nd and 3rd Divisions each to detail a battalion to move at very short notice to Second Army area. The two battalions selected were the 27th Canadian Infantry Battalion and the 4th Canadian Mounted Rifles. The battalions carried out this movement on the 29th July. The 27th Canadian

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Infantry Battalion went into the line Locre Sector, and the 4th Canadian Mounted Rifles into the line La Clytte Sector, on the 1st August. These units were relieved on the 3rd and 4th August respectively. During the tour of duty in the front line the Germans obtained identification on the first night. The battalions entrained for Fourth Army area on the 5th/6th August. The Germans were completely mystified. They thought the Canadians were going into the line in the Second Army area, and when the attacks came on the 8th August they found the Canadians were in full force near Amiens, and were much disgusted.

Now, as I have shown, the taking of prisoners cuts both ways, and I will give you two instances to show how important it is to impress on our men that if taken prisoners themselves they must not disclose more than their name and rank. The first instance is this. In September, 1917, the 1st Division were trying to push into Houthulst forest, and had made plans for a small attack. Two days prior to this one of our men was taken prisoner and, under cross-examination, gave away both the zero hour and the approximate extent of the attack. The next day a German runner lost his way and came into our lines with a paper on him showing that, in consequence of this information, their front line was to be strengthened by one machine gun company and an extra battalion. The attack, needless to remark, did not come off as arranged, though if it had not been for catching that German with the order on him, it would have got a very nasty reception. Now, once more, from the enemy's point of view, there was a very interesting summary issued by G.H.Q. on the 21st October, 1915, to show how information was getting to the Germans. The Summary read as follows:— "Attention is directed to the methods by which the Germans identify units in the front line, namely:—(a) On the 1st November, 1915, out of 48 identifications on the British front, 11 had been established by the capture of prisoners, 23 had been established by prisoners' statements. The whole distribution of our 5th Division appears to have been disclosed to the Germans by prisoners of one regiment captured on the 26th September, 1915. Nine had been established by men killed, and five had been established by captured equipment." Now we see that on the 5th March, 1916, our fellows are beginning to learn a little. "Out of 24 identifications

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on the British front, six had been established by the capture of prisoners, one had been established by prisoners' statements, three had been established by men killed, two had been established by captured equipment, and 12 had been established by the 'Moritz' listening apparatus."—"IT." I am going to talk to you about "IT," the listening apparatus.

It is noteworthy that the use of the listening apparatus appears to have developed between the 1st November, 1915, and the 5th March, 1916. By the latter date the listening sets were giving exactly one-half of the total identifications received by the Germans. Our own experience with our own listening apparatus points the same lesson: unless most careful precautions are observed in the use of telephones, military secrecy becomes an impossibility. I think most of us here will remember how often divisional and corps headquarters used to pull up the forward troops for indiscreet conversations on the telephone. I regret to say, although I am a gunner, that the artillery were by far the worst offenders in this respect. I have here a few examples of such indiscreet conversations picked up by "IT"—our own listening sets.

In May, 1917, somebody shouts out, on the 3rd Corps front: "Are the 5th Leicesters in that line too?—Yes. Which company? A. On the right."

Again in May, 1917, the 3rd Corps: "You have to go down and get us billets. You must be at Montigny Farm at 9.30 a.m. That is brigade headquarters, is it not.—Yes." Imagine the nice sort of time brigade headquarters would have after that!

Once more, in May, 1917, 3rd Corps: "Do you know where the 177th M.G. Company is?—Yes, in Jeancourt."

July, 1917, Canadian Corps: "Hello. Yes. Well we got down there and found that the 2nd and 7th Divisions artillery were holding it. Getting ready for the big push I suppose?" February, 1918, 22nd Corps. "Hello. Is that A.C.? Yes—Staff Captain speaking. Please send a guide to meet the brigadier and brigade major at the cross roads, X.23.b.15 at 6 a.m. to-morrow." You see the danger of talking down the telephone especially with listening sets about.

Now a word with regard to documents. The soldier's pay book, which nearly every army in the world uses, certainly on the con-

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tinent, is the most valuable document to get hold of. In the German Army it is called the "*Soldbuch.*" Diaries also are invaluable. The German soldier always wrote down the names of his leaders in his diary, especially the names of his corps and divisional commanders, and they always gave us a clue to leadership, a point of importance I laid stress on in the early part of my lecture. Here are some good examples of the results of captured documents. The second example shows how negligence is punished. The third example is an important illustration to show how the hostile "order of battle" is watched.

The first example was in 1916. When we were attacking Delville Wood, a German runner who had lost his way, came into our lines and was captured. He was carrying a relief order, showing the exact spot where each battalion of the incoming division was to meet its forward area guides, together with dates and times. This had been sent in duplicate by two runners. The one apparently got through; the other captured by us was presumably considered killed. The relief took place according to plan; but in the meantime we had arranged to concentrate every available gun on the points of assembly given in the relief order. The result, as was found out afterwards, was that the incoming division had about 40 per cent. casualties, and some of its units had to be withdrawn before they had taken over their line.

Here is the case of negligence on the part of an officer. About a fortnight later an exactly similar document was obtained in a small attack which penetrated temporarily as far as battalion headquarters. This paper was put by an officer into his pocket, where it lay for four days before being sent back to brigade headquarters. By that time the relief had taken place, and an invaluable opportunity of inflicting further heavy casualties without loss to ourselves was consequently lost.

Here is a case of watching the "order of battle." During the Somme battle G.H.Q. took the greatest trouble in keeping themselves informed of the exact location of every German division. On one occasion, however, all trace was lost of two divisions, and it was thought that there was considerable danger of a sudden counter-attack developing on a large scale, which might have considerably upset our plans. At this moment we raided the German lines in the Ypres salient, and, among the documents captured, was a post-

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card from a man in one of the lost divisions to his cousin in the unit holding this particular bit of the line. On this card was the picture of a small French village church together with the name of the village; and the man had written on it: "We are having a quiet time in reserve in this village." This was a distinct clue. Inquiries were at once set on foot from other intelligence sources, and the two lost divisions were found to be concentrated in that particular neighbourhood.

Now the last example I am going to inflict upon you is an interesting one. From Mesopotamia we get an example of the first class of the far-reaching effects of fighting troops capturing and transmitting to the proper quarter documents, the importance of which evidently struck the capturers. In the course of the fighting which immediately preceded the capture of Baghdad in March, 1917, a considerable number of Turkish and German documents were collected by British and Indian troops from positions along the Tigris which the enemy were compelled to evacuate. Amongst these documents was a small pocket book picked up by an officer out of the bottom of a barge. The book was soiled and dilapidated, and its contents, written in pencil, had become so blurred that the officer could not make out more than that the writing was in German and that the whole appeared to be some sort of route report. Realising, however, that his find might be of some importance, he took steps to ensure that the book was sent direct to General Headquarters. There the book was examined by the Intelligence Section of the General Staff and found to be a carefully compiled report on a journey from Berlin to Baghdad, undertaken only a few months previously by a German treasure convoy. The entire route was dealt with, and from Birejik onwards the report contained a minute description of every stage along the Euphrates, by which river the convoy travelled in small native boats known as *shakhturs*. With the exception of a few motor launches, these *shakhturs* were the only type of craft available on the river, and every possible detail connected with their numbers, carrying capacity, etc., had been faithfully recorded by the methodical German author. In addition he had collected particulars regarding landing places, rapids, currents, supplies, etc.; in fact he had omitted nothing that was likely to be of use to the

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German military authorities. The consequence was that a translation of the report placed Sir Stanley Maude in possession of information which could hardly have been improved upon had he been able to send an intelligence officer of his own to investigate the possibilities of the Euphrates as a military line of communication. The information in question proved of the greatest value when, in the following winter, the Germans and Turks were known to be contemplating a combined offensive with their so-called "Yilderim" army, which was to move down the Euphrates on Baghdad with the object of retaking the city from the British. As things turned out, this offensive never materialised, but, thanks to the report contained in the pocket-book, the General Staff had all the information they wanted. They were able to calculate with considerable accuracy the maximum strength of the Turco-German force that could be brought against them by the Euphrates route, that is to say, from all this data they were able to make an estimate of what sort of force was coming against them, and so to make the necessary dispositions to meet the threatened attack. So that if that officer had not picked up that dirty little book out of the bottom of the barge and sent it down to headquarters, it might have led to unfortunate results.

It was my intention at the outset of this lecture to impress on regimental officers the vital importance of all information obtainable by fighting troops being sent to the Intelligence Section of the General Staff. I may have laboured the point a little in your opinion, but I assure you, from a commander's point of view, it cannot be laboured too much, and I will conclude by thanking you for the great patience with which you have borne with me, and will repeat once more in the words of the Manual, that "An efficient intelligence is dependent on the efforts of fighting troops."

MAJOR-GENERAL SIR H. W. HODGSON: Does anyone wish to ask any question, or to make any remarks on the lecture?

(No answer.)

MAJOR-GENERAL SIR H. W. HODGSON: That means, I suppose, that you are all very pleased with the lecture, and very satisfied that Sir William has gone into the matter so thoroughly. Then nothing remains for me but to thank Sir William on behalf of you all for the very interesting lecture he has given us.

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ARTILLERY TACTICS.

BY LIEUT.-COLONEL A. A. GOSCHEN, D.S.O., R.A.

IT has been said, that a characteristic feature of the modern battlefield is its emptiness. This emptiness is the result of the increased fire power of modern weapons, which has profoundly affected the tactics of all arms. The increase in fire power necessitates surprise, and concealment from view when not protected from fire. The modern attack, in consequence, consists essentially of a sudden, and intense concentration of fire on to the objective, under protection of which the assault is delivered: the defence consists of a co-ordinated network of fire, under the protection of which the troops allotted to the counter-attack can operate. There is abundant evidence to show that the developments in artillery tactics necessitated by this increase in fire power, and by certain new developments in artillery technique, are insufficiently realised, and there is a tendency to judge it according to a pre-war standard.

Comparisons are odious at any time, and a comparison of the artillery of to-day with the artillery of 1914 is absolutely impossible. There are four definite facts which have revolutionized artillery practice since the pre-war days:—

(1) The automatic weapon.
(2) The instantaneous fuze.
(3) Predicted shooting.
(4) Counter battery work.

It is proposed to discuss these four factors, and their influence on the artillery of to-day.

1. The automatic weapon had, it is true, made its appearance before the war, but its power was neither fully realised nor exploited; to-day it represents the principal fire power of the infantry. For all practical purposes, it delivers the covering fire in the hands of the infantry, under which every minor attack, and some major ones are made, and, to quote F.S.R., provides with artillery the framework of the defence. During the late war, attack after attack

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was brought to a standstill solely through the fire of automatic weapons. There can be no doubt, therefore, that one of the principal objectives for artillery fire will be the enemy's automatic weapon. In the pre-war days, it was supposed that the assault would be preceded by a fire fight, for which purpose the assailant would gradually build up a firing line of very considerable density and vulnerability, and, having mastered the enemy's fire, would ultimately deliver the assault. To-day the situation is very different, the covering fire being provided by groups of automatic weapons carefully concealed, and widely separated; and by artillery fire.

Now leaving out the question of artillery support in whatever form it may take, and turning to the covering fire of the automatic weapon, we find ourselves up against a very elusive artillery target. It is not too much to say that anybody who is being fired at by an automatic weapon has only a very rough idea from where the fire is coming, and that the automatic weapon delivering the fire is extraordinarily difficult to locate accurately; in fact, if we wish to engage it effectively there are only two methods of doing so :—

(a) To push up observing stations so close that they can see every detail of the enemy's positions. This entails pushing up the weapon which the O.P. controls close to the O.P.—long communication being both slow and unreliable on the battlefield, as was found at Le Cateau, and more than confirmed in every subsequent battle. This again entails that the weapon employed should be one having a curved trajectory; a high velocity gun is absolutely useless for this purpose, as it is impossible to find positions from which a gun can fire at short range without exposure.

(b) To cover the whole area in which the machine guns may be located with bursting shell, and so to kill or frighten the machine gunners sufficiently to induce them to leave their weapons. This method requires fairly comprehensive artillery arrangements and an elaborate system of communication between batteries. This system of communication will, however, be outside the forward area and will be reasonably secure. It implies a centralised form of organization for the artillery, and that a central authority

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is supplied with information as to the area to be treated. This area may be delineated by the forward troops, or it may be indicated both to the forward troops and the artillery by the H.Q. of the formation to which both belong. It further implies that ample ammunition is available, and that there are sufficient guns to fire it.

It appears that method (a) must be adopted for highly mobile and minor operations. The infantry will require a quick and accurate fire brought on a definite objective, and to fulfil their demands guns must be continuously pushed forward, as the advance progresses, close to advanced observing stations from where they can be commanded by voice. A rapid engagement of the target rather than a great volume of fire will be the essential requirement. For tasks of this sort some form of weapon with a curved trajectory is an absolute necessity.

Method (b) must be adopted for all major operations. The success, or otherwise, of this method will depend on the foresight of the commander in predicting his artillery requirements, and the possibility of the leading troops supplying information quickly and accurately as to their requirements. This latter has so far proved impossible, and until a solution is found it will not be possible to make full use of artillery fire.

It is, however, possible for a commander to foresee the successive tactical localities on his line of advance, the capture of which will enable him to make progress along his whole front; it is against these objectives that he will concentrate his artillery mass. In the bombardment of these objectives, the artillery should aim at developing the greatest possible density of shell for a short period: a French writer estimates that, after an intense bombardment of three minutes, all the occupants of the locality will be either incapacitated or have found places where they are immune from fire, that their nerves will be very shattered; and that momentarily their fighting value will be very small.

2. The instantaneous fuze has made the shell fired from a comparatively low velocity weapon into a mankilling projectile. It is not proposed, here, to discuss the relative merits of high explosive and shrapnel; and certainly not to claim, that shell for shell, the high explosive is as effective as shrapnel, but it is beyond

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dispute that the H.E. shell bursting on percussion, makes far less call on the skill of the gunner. This is a great recommendation when we remember the enormous expansion of the artillery in war—it is less expensive to make, while its moral effect at any rate is far greater. In addition to the shell itself we must consider the weapon which fires it. Tactically the lower velocity weapon has enormous advantages; its curved trajectory enables it to be sited close to the O.P. without exposure, and this fact enables it to be controlled with ease and certainty, making it a weapon, *par excellence*, for dealing with a rapidly changing battlefield. In addition, its low velocity makes it difficult to locate by sound-ranging, and its smaller flash by flash spotting, and it therefore secures comparative immunity from the hostile counter batteries. Economically the low velocity weapon wears much longer than the higher velocity one. The low velocity weapon, now that the instantaneous fuze has transformed its shell into an effective man-killer, should be the main weapon for divisional artillery, while the gun should be kept for army artillery allotted to divisions taking part in attacks against organised defences, and requiring the support of a mass of artillery.

3. Predicted shooting has added a power to the artillery which would have been impossible to imagine before the war, and it has developed immensely during the last few years. It enables every variety of battery, from all directions, to be concentrated on to an objective at the will of the commander without previous registration, and results in a concentration of fire devastating in its intensity. In order to develop these concentrations of fire, it is necessary to establish reliable communication within the artillery and, if accurate maps are not available, some survey work will be necessary. These operations do undoubtedly take some time to initiate, and it is unlikely that such concentrations could be staged in a really fluid type of battle. When, however, organised resistance is encountered and the intervention of a mass of artillery becomes necessary, the greater part of its fire will be directed by prediction. It is important to notice that the position of batteries and objectives having been once fixed, every battery can fire on any objective within its range whether in its normal zone or not, that the technical calculations necessary are simple and can be made quickly and simultaneously

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in all batteries. A concentration of twenty or more batteries can, therefore, be prepared as quickly as a concentration of six. This power of concentrating rapidly widely dispersed batteries is very much facilitated if the gun-carriages are provided with wide arcs of fire. The provision of these wide arcs is desirable in the light and comparatively short ranging artillery, but becomes more essential as the range increases, if we are to make full use of the fire power of our medium and heavy artillery on widely separated portions of the front. The French have provided their 15·5c/m gun with a carriage which is admirable in this respect and the gun can in consequence engage targets spread over a front of 20,000 yards with very little loss of time. Such are the possibilities of modern predicted shooting. Have we adapted our tactical methods to make use of it? Have we decided who is to initiate the orders for its employment? Is this great fire power to be at the disposal of the leading infantry, or is the commander to combine the efforts of artillery and infantry to secure the common goal?

There is no doubt that it is the function of the commander to select the successive objectives for the concentration of artillery fire and infantry assault, but the practical difficulties in doing so are very great once the battle has progressed beyond the initial time table. In this partnership for the common good one arm or the other will in all probability develop into the senior partner and it will be considered which of the two should hold this position. Taking the infantry first as the senior partner. The possibility of the timely support of a mass of artillery depends, almost entirely, on the transmission of information from front to rear. As we knew during the war, the difficulty of achieving this proved insurmountable; in the face of the hostile artillery, and small arm fire, no form of communication, except the runner, proved reliable, and information delivered in this manner was so slow in reaching the guns that it was useless. With the advance in wireless science, we have the additional assistance which this form of communication will give us, but taking into account that what we require is information regarding the leading troops, we cannot think that we have developed a system which, at present, gives us any hope of getting it quickly enough to be of use in controlling the fire of the artillery mass.

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Taking the artillery as the senior partner. We see at once the obvious advantage in having the commander in more reliable communication with his artillery. There is still the same difficulty of communication forward from the commander to the leading infantry, but as in the case we are considering the infantry are the junior partners the necessity of supplying them with information is not so vitally urgent. Their role would be to take advantage of the concentrated fire of the artillery to occupy ground won for them by the artillery acting under the orders of the commander. That such a role would cramp their initiative is obvious, but there is every reason to suppose that the communication between the commander and his artillery would be so secure that his orders could be relied upon to reach the guns with certainty and rapidity, and that in consequence the battle would develop according to his wishes. It would seem, therefore, that in those stages of the battle in which a really powerful artillery could be controlled by the commander, it would be wise to subordinate infantry movements to artillery fire. The general role of the infantry should be to occupy ground made good as a result of artillery bombardments directed by the commander on those localities which were successively considered to possess tactical importance. It would appear essential to give due weight to the power of artillery in our training. It is admittedly difficult to imagine the result of a bombardment, more difficult even than to imagine the power of a flagged enemy. The result of the heavy call on the imagination is that, generally speaking, during training the effects of an artillery bombardment are never seriously considered: the results of this both on the action of the other arms and of the artillery are difficult to exaggerate, The infantry hardly consider it worth while to expend the necessary energy and time in establishing satisfactory communication with their supporting artillery, while there is a danger that the artillery may become bored with their combined tactical training and devote their energies to their technical work and annual practice.

4. Counter battery work was practically unknown before the war, but now we inherit a thoroughly satisfactory and effective system built up during the war, and it must not be allowed to stagnate. Success in counter battery work depends on a close under-

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standing with the air force and close co-operation with the sections of the Survey Company—flash-spotters and sound-rangers. As the infantry rely more and more on the artillery for covering fire both in attack and defence, the importance of attacking the weapons affording this covering fire will become even greater: in fact it seems possible that if our counter battery work develops it would be preferable to engage the guns giving covering fire to the attack, leaving the defending infantry, unmolested by the hostile artillery, free to use their weapons to beat off the attacking infantry. Without doubt counter battery work will commence from the moment two opposing armies gain contact, and in the early stages will be carried out almost entirely by the light artillery working under orders of the divisional commander. The decision as to the number of batteries to be allotted to this work must rest with the divisional commander and will prove no easy one to arrive at. During training it is almost impossible to come to a decision on the efficiency or otherwise of counter battery work, and for this reason it is not generally practised, but it is essential that it should form part, and not an unimportant part, of every operation.

It is hoped that enough has been said to show that in the artillery of to-day the commander has in his hands a weapon differing fundamentally from that of pre-war days. The machine gun has compelled the more powerful and vulnerable weapon to take cover from view, or lose at any rate its mobility at ranges below 2000 yds. and so makes the high velocity gun impossible as a close support weapon. In organised attacks we are forced to bombard methodically all areas capable of concealing a weapon whose fire power is such that a single barrel can hold up the attack of a brigade, and which is to all intents and purposes invisible. The commander has, however, in his hands a weapon which is capable of a concentration of fire which literally destroys everything against which it is directed; and through which he can impose his will on the battlefield in the true Napoleonic style. To enable us to make use of this power to the full some modifications are necessary to our ideas of the combined tactics of artillery and infantry; the latter must be prepared to take advantage of opportunities created for them by the artillery on the initiative of the commander, and not expect the guns to be confined to supporting movements initiated by the infantry.

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TANKS IN REAR GUARD OPERATIONS.

By Colonel J .F. C. Fuller, d.s.o.

1. The Principle of Security.

In rear guard actions the governing principle of war is that of security, secure movement being the object of a force in retreat. To gain this security it is necessary to delay the pursuing enemy, consequently rear guards must possess a high and flexible offensive power.

The object of a rear guard is to gain time, it accomplishes this not only through fighting but through threatening to fight. A pursuing force, it must be remembered, is seldom numerically a strong force, frequently it is a tired force and more often than not it is partially disorganised. Its moral may be high, especially so if the pursuit follows on an important victory, but it must be remembered that unless moral is firmly established on a stable organisation, it is subject to rapid fluctuations. This being the case, a rear guard commander should always attempt to attack the nerves of the pursuing enemy, that is to say he should, at every turn, attempt to gain his object by means of surprise. The importance of this becomes apparent if we compare the conditions in which delaying and pursuing forces have to work. As regards the first, every minute isolates it more and more, for its main body is moving away from it; as regards the second, every minute is bringing assistance closer to it. Consequently concentration of force is difficult for a rear guard, whilst for a pursuing force it is comparatively easy. Hence to economise his strength a rear guard commander must mainly rely on surprise, that is on the moral attack. This demands a high order of leadership. For this form of attack conditions are in his favour, as in a game of hide and seek. He can generally select his positions, but the pursuer has to seek him out; he has to penetrate into the unknown and, if his temerity is repaid by a severe rap on the knuckles, the moral of his men will rapidly be lowered, and the lower it falls the slower will be the pursuit. I mention this because

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I believe surprise to be even a more potent weapon in retirements than in attacks. But surprise must be immediate, it must be a sudden and unexpected flash, and then, whilst the enemy is bewildered, under cover of this bewilderment a rapid withdrawal must be made and a new surprise mounted.

2. The Conventional Rear Guard Action.

The conventional idea of a rear guard action is somewhat as follows:—The rear guard halts, takes up a position, forces the enemy to deploy, then it falls back and repeats this action. By forcing the enemy to deploy, time is gained. However excellent this procedure may appear on paper, in reality it seldom takes place. In reality, what we normally see is a weary force of men falling back more or less anyhow, some fighting it out to the last, others legging it for all they are worth. Nobody knows, even approximately, what is happening, or whether their flanks are covered or uncovered, or where their headquarters and first line transport are. What is the reason for this sorry state of affairs? The reason is a very simple one. Movement is based on leg-power, and leg-power limits every action of the soldier, especially so in retirements, when every minute is isolating the rear guard more and more. Leg-power reduces the soldier's moral by fatiguing him; it prevents him remaining over long in any one position; it does not enable him to keep close touch with units on the flanks of his own; it demands that he should keep close to his cookers and ammunition; it, in fact, limits his actions to such an extent that the conventional picture of a rear guard engagement is the exception and not the rule. If you examine the rear guard actions of the last war, you will find that four out of every five were chaotic, and that the pursuer was delayed not because he was forced to deploy, but because his leg-power would carry him no further.

3. The Influence of the Tank on the Conventional Idea.

During the war, very few tank rear guard actions were fought, but from those which were, two facts are outstanding. The first, that when tanks counter-attacked, the enemy were thrown into a panic, and the second, that on account of the slow speed of the machines and their short radius of action it was most difficult to

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withdraw tanks any distance in face of field artillery. The weak point in the tank was that it was slower than a horse drawn field gun. This difficulty has to-day been overcome, for the Vickers tank possesses a maximum speed of 16 miles per hour and a circuit of about 100 miles.

Remember the picture—infantry, artillery and cavalry falling back and forcing the pursuing infantry, artillery and cavalry to deploy. In this picture place the Vickers tank. It is no good deploying infantry and cavalry against tanks, consequently if the pursuer deploys anything—it will be tanks and artillery. Once he has deployed them he will probably maintain them deployed, certainly his tanks, and will continue to attack with them until the resistance of our rear guard is broken. If the enemy does this, it is no good reinforcing the rear guard with cavalry, in place we shall have to push up tanks and artillery, and if we find our infantry and cavalry of little use, we shall be wise to withdraw them to the main body. The conventional picture has now completely changed. We have a rear guard of tanks and artillery and the enemy has a pursuing force of the same weapons. Behind the enemy's pursuing force is advancing a muscular army which can take little part in the action; in front of our rear guard is retiring a muscular army the safety of which depends almost entirely on the endurance of its rear guard. If its rear guard is annihilated it is helpless and yet it is equally helpless if called upon to support its rear guard. Meanwhile the rear guard action is nothing like the old conventional action—ploying and deploying, but much more like a naval action, especially so if the artillery on both sides is tractor drawn or mounted. It is a running fight between two forces which are self contained for a journey of 100 miles, and these two forces can advance and fall back without using roads. We have here quite another picture and I will now examine it in detail.

4. Aircraft and Cavalry in Rear Guard Actions.

I will start with the assumption that the rear guard consists solely of tanks and tractor carried guns. Before its commander can do anything he requires information:—

First, where is the enemy and how is he distributed?

Secondly, where are our own troops?

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Thirdly, what is the nature of the country?

Unless he can gather information on these three points he cannot maintain his object, namely, the delay of the enemy. His tanks are somewhat blind and they cannot well reconnoitre the enemy's advance. Aeroplanes are much more suitable for this work and also for maintaining touch with the retiring body. Therefore he must have aeroplanes, for they will help him to overcome the first two of the above three difficulties.

Now as to the third. The aeroplane can examine the ground in bulk, but not in detail. It cannot descend into the middle of a forest and see whether tanks can move through it or not. It cannot reconnoitre a copse as a suitable position for an ambush. It cannot move about the country questioning the inhabitants. To use tanks for this purpose is to reduce your right hand punch, you must economise them and this can be done by using cavalry. Not to charge and attack but to scout and to see. Given an adequate number of aeroplanes and a force of well-trained horsemen, the rear guard commander's work is tremendously lightened, in fact these two arms to-day are essential to skilful rear guard work.

5. Infantry in Rear Guard Actions.

I will now assume that both the rear guard and the pursuing force have aeroplanes and cavalry as well as tanks and guns, and that, after three or four days' retirement a hilly and wooded country, such as the Ardennes, is entered. Here a stand is to be made until the main body can get through the defiles. Ground suitable for tank and artillery action is limited, in fact a great number of these weapons might prove rather a hindrance than a help. The rear guard soon gets involved, and the tanks, mainly occupying the roads, are open to infantry annoyance and are particularly vulnerable to mountain artillery. The reason for this is that, though it is not difficult to hold a defile with tanks and field guns against tanks and field guns, it is difficult to command the intervening spaces between the defiles. For mountain warfare, infantry and pack artillery are required, also are they required for tank warfare in hilly, swampy and thickly wooded country.

Here we come to another difficulty; if we allot infantry and pack artillery to our rear guard for operations in country unsuit-

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able for tanks, though in this country they may be of the greatest assistance, in open and good tank country they are not only of little assistance but a veritable hindrance, Why? Because they impede the mobility of the tanks and tractor mounted guns and by doing so they seriously reduce their tactical power. The one thing a tracked rear guard does not want to have to do is to convoy muscle moving troops. The only way out of this difficulty is to mount the infantry of the rear guard in cross-country buses, and if a pack gun cannot be invented which can be man-handled up hills and through woods, there is nothing for it but to put the mules into tracked conveyances. A little while ago I stated that it was no good deploying infantry against tanks, and I adhere to this statement, for in hilly country, if you have infantry and if you use your infantry on the hills and not in the valleys, you will not be deploying them against tanks but in areas free from tanks, and areas in which they can both annoy the mechanical forces in the valleys and engage, on equal terms, troops similarly equipped to themselves.

What should our ideal rearguard consist of? I think of the following arms :—

(1) Fast moving tanks and armoured cars.
(2) Fast moving tractor mounted guns.
(3) Aeroplane for distant reconnaissance.
(4) Cavalry for close reconnaissance.
(5) Infantry and Sappers carried in cross-country buses.
(6) Pack artillery which can be man-handled.

Having arrived so far, I will now consider the tactics of such a force.

6. Tactics in Open Country.

I will imagine that a battle has been fought and that we have been defeated and are forced to retire. Here is a complex situation, in which the first problem is the establishment of a rear guard. In my opinion, the rear guard should be formed not out of the battle front, but out of the reserves and well in rear of the battle front, and the tanks of the rear guard should be so placed that they can attack in flank hostile tanks which are held in front by artillery fire. Before this can be done the map must be consulted and, if time permits, the ground in rear of the battle front reconnoitred.

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As a matter of fact this reconnaissance should take place during or even before the battle opens. A wise man takes no unnecessary risks and no general can say, at the opening of a battle, whether he is going to win it or not. If he has got to withdraw, a little foresight before battle may well be worth a corps of fresh troops after a battle is lost.

The map should be chalked over in two colours, for instance—red where tanks can operate and blue where they cannot, or find difficulty in doing so. Once the wheeled vehicles have been cleared back, the forward infantry should be ordered to retire over the blue areas; these will probably be roadless, and as the withdrawal is more likely than not to take place at night, unless the infantry have been trained for this work and the staff know how to carry it out, it is likely to end in chaos. Now as regards the red areas. In these the guns should take up frontal positions and the tanks flanking ones, or *vice versa*. In the first case the guns will attempt to hold the enemy's tanks and the rear guard tanks will attempt to take them in flank. In the second case the rear guard tanks will entice the enemy's tanks to advance so that the guns can take them in flank. Remember that in every operation you must have a left as well as a right hand punch, in other words offensive action is based on secure distribution of strength; in the first case your guns are your base of action, in the second your base is your tanks. As the blue areas cannot be left unguarded, it is here that the infantry of the rear guard should be deployed with their buses conveniently at hand. The more automatic weapons this infantry is armed with the better, and if they are equipped with heavy machine guns and portable land mines they will be able to do some damage to hostile tanks which come their way.

If the country is so open that tanks can cross it everywhere, then in place of dispersing the tanks they should be concentrated in strong groups whilst the guns should occupy as wide a front as is tactically sound. The guns will then be able to hold the enemy's machines at a distance, whilst the tank groups manœuvre to attack them. I naturally cannot enter into all the possibilities of open country fighting, but I think I have dealt with the main problems. Whilst this action is being fought out, the cavalry and sappers should be well in rear reconnoitring the country and preparing demoli-

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tions and the armoured cars well on the flanks attacking or at least threatening the enemy's rear. That these fast-moving machines should be armed with a light high-velocity gun is essential.

7. Tactics in Hilly Country.

I will now suppose that the rear guard has fallen back to a range of hills, such as I mentioned earlier in this paper. Here it obviously becomes possible to divide the ground to be held by the rear guard into areas suitable and unsuitable to tank action. The tank areas will vary in width but will normally be narrow. The flanks of these areas will be very vulnerable because tanks and tractor mounted guns are not suited to hill climbing, and if the ground is rocky it may be quite impossible for them to cross it. The danger of these exposed flanks is a two-fold one. First, if the enemy can occupy the hill sides with mountain artillery, the tanks may be destroyed; secondly, if he can occupy them with infantry, though the tanks cannot be destroyed by bullets, their crews risk being besieged in their machines. To protect these flanks, infantry and mountain guns must be used, and should be employed not only in order to drive the enemy's infantry and gunners off the slopes and summits of the hills, but to attack and raid his tanks and guns in the valleys below. As tracked vehicles are more influenced by the nature of the ground than infantry, in hilly areas, the demolition of bridges, and the blocking of defiles will seriously delay mechanical movement, consequently sappers must know exactly what types of obstacles will prove most effective. Breaking down a heavy tank on a narrow road may block it for several hours, and detonating a tank filled with explosives may prove, in certain cases, a useful expedient.

8. Tactics in River Country.

Until tanks are rendered amphibious, rivers will remain a definite obstacle to tank movement, and even if they are able to cross water, where banks are steep, or the land is swampy, rivers will still remain difficult obstacles to cross. At present the weight of a tank and, consequently the thickness of its armour, and the size of its guns, is limited by the strength of the bridges to be crossed. Destroy these bridges and hold the river banks with machine guns

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and the construction of new bridges is seriously delayed. From the infantry point of view, a river forms the best of tank obstacles, for whilst infantry can generally cross rivers with ease, tanks can only do so with difficulty. If mechanical weapons increase and amphibious machines are not built, rivers will undoubtedly play an increasingly important part in rear guard operations. In these actions I am of opinion that the river bank should be picketed by the infantry of the rear guard and that the tanks and tractor mounted guns should be distributed in two or more groups in rear of the infantry and flanking the most likely crossings. Directly the enemy has effected a crossing, the infantry of the rear guard should retire, the tractor mounted guns should manœuvre so that they can open frontal fire on that portion of the enemy which has crossed, whilst the tanks deliver a flank attack. Or this operation may be reversed.

9. Tactics in Wooded Country.

The normal wood or forest is not a suitable area for tank movements; nevertheless woods form excellent places wherein to establish ambushes. In thick woods infantry are safe from a tank attack, but they can do nothing to prevent the enemy's machines moving round the woods and cutting off their retreat. Consequently, when infantry occupy a wood they should be supported by artillery, mainly located in the wood and on its flanks. If several woods are thus held, the tanks should be grouped in rear of the intervals between the woods, so that they may cover any dead ground and engage hostile machines which, driven away from the woods by the guns, seek to outflank them. In a wood possessing good rides there should be little difficulty in hiding within it a large number of tanks. This possibility should be remembered, for, as I have already stated, there are few operations so effective as a well placed ambush to delay a pursuer.

10. Tactics in Towns and Villages.

Towns and villages held by an enemy form bad tank objectives, but if held by our own troops they frequently form good tank areas. When a town or village has to be held, its outskirts should be picketed by infantry and field artillery and tanks should be held

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in reserve, preferably in a central position, or if the town is large, in three main groups—one central and one on each flank. If this be done, the central group can be used for street clearing operations, and the flanking groups for open action against the flanks of the enemy. It may sometimes be found effective to group the tractor mounted guns outside the town and on its flanks so as to protect the line of retreat.

11. The Importance of Ground.

The subject of this paper is a very complex one and I have done little more than outline a few possibilities and only tactical ones at that. In mixing mechanically moved weapons with marching troops, it must never be overlooked that considerable modifications will have to be made in administrative as well as in tactical staff work. As weapons move quicker, staff officers must think quicker, and unless they have thought out all kinds of possibilities beforehand there will be no time to do so after an engagement has begun. Tactically you will not go far wrong if you remember two things. First, always study the ground, even if only off a map, and distribute your arms—infantry, cavalry, artillery and tanks according to the ground and with reference to protection, offensive power and movement. Secondly, never forget that if you have two or more arms under your control, tactical co-operation is mainly attained by making one arm the base of action of the other, according to the nature of the ground. Whatever you do, your left hand punch must be followed by a right hand one. A one-armed man will not make a good boxer, and any single weapon unsupported by another is at a serious disadvantage if opposed by its like co-operating with a second weapon which can protect its advance.

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MOUNT EVEREST, 1924.

By Lieut.-Colonel E. F. Norton, D.S.O., M.C., R.A.

ABOUT the middle of December, 1921, I was completing a year's course at the Staff College: I had just heard that I was destined for a job at Canterbury and, soldiering in England being something of a new experience to me, I was trying to adjust my mind to the prospect and wondering if I should find peace soldiering at home and the comparatively tame sports of this overcrowded country of ours as much to my taste as the life I had been accustomed to in India: and I confess I was doubtful about it; for the Great War was—as Kipling has it—like Army shag: hateful as it was it spoiled a man's taste for milder things. As I sat in a lecture room and pondered over these matters—and the higher strategy—a telegram was handed to me, the gist of which was that if I would like to join the Mount Everest Expedition of 1922 I need only pass the doctor and square the military authorities for leave. Why a mere scrambler in the Alps with no pretentions even to the title of mountaineer should have received such an offer remains a mystery to this day, but the answer was obvious and, the requisite conditions being fulfilled without any difficulty, I found myself in a position to realise one of the ambitions of my life and see that "roof of the world" which has always had a magnetic attraction for me. This briefly was what led to my being, in 1924, once more a member of the Everest Expedition, and this time General Bruce, leader of the expedition, was kind enough to ask me to go as second in command and leader of the climbing party.

I have passed through most of the Indian hill stations; to my mind not one of them can hold a candle to Darjeeling; its views and its flowers alone entitle it to pride of place, and no one who has once seen it will easily forget that unique panorama of the great Kinchenjanga range tinted pale gold and floating high in mid air, gradually fading, fainter and fainter, more and more golden, until, about mid-day, its dim outline disappears into the warm mauve haze of a March day. Here towards the end of

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March, 1924, we assembled probably the strongest party that has ever been collected to climb a big mountain.

Mallory, Somervell and Geoffrey Bruce were veterans of 1922, the first of 1921 as well. Odell, Beetham and Hazard were Alpine climbers of outstanding reputation for speed and toughness. Young Irvine "our experiment" as General Bruce called him, hall marked for endurance by his rowing record at Oxford and his sledging experience the previous summer, had climbed in Wales, the Alps and Spitzbergen. I made the eighth climber. Shebbeare of the Indian Forest department shared the duties of transport officer with Geoffrey Bruce. Hingston, I.M.S., was our medical officer; Noel our kinema artist—and it is noteworthy that, as a newly joined subaltern in 1913, he first essayed the journey through Tibet to the north side of Mt. Everest. Last and most important General Bruce, as leader for the second successive year, brought the full weight of his wide Himalayan experience, his extraordinary influence over and knowledge of the hill folk and his cheerful genius for sweeping away difficulties and ensuring a united and happy party.

For many years I have held that the most useful make and shape for an all-round man is a stature of 5ft. 11ins. and a weight of 11st. 7lbs. in clothes; it was interesting to me to see how the attempts to climb Mt. Everest have evolved a type and how nearly the type approximates to my own ideal. Mallory, Somervell, Hazard and Geoffrey Bruce fulfilled it almost exactly and they could all have been very respectably fitted with one another's clothes, while Odell only deviated from type by an inch or two of extra height. The party was a striking one; all showed the unmistakable signs of perfect physical fitness; their average age was 34 (including Irvine who was 22) and I may say at once that I doubt if a more congenial and happy family has ever come successfully through the trials of an expedition of the sort, a sure test of those essential moral qualities which count for even more than physical pre-eminence. The two Bruces, Shebbeare and I had been in Darjeeling for a month and, besides completing a vast amount of detailed work on stores and equipment, we had already selected the 80 odd Himalayan members of the expedition—cooks, syces, specialists and porters; we picked the whole of these from the large number of men who volunteered in Darjeeling; practically

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all were either Sherpas or Bhutias—the latter Tibetans pure and simple, the former men of Tibetan stock who inhabit the highest valleys of Nepal. Here again we have evolved a type: your successful Mt. Everest porter is a light and wiry man; he must not carry a load of brawn and muscle in addition to his pack.

Go to a battery swimming bath in India when the battery is holding aquatic sports; from among the officers and gunners you will pick many of the type I have already described as that of the ideal Everest climber; now turn to the drivers and pick from among them the active athletes and football players; just such light and limber men, full of muscle but with no superfluous weight, were our best porters. Some of the bigger and burlier men were good up to—say—23,000; above that only one has ever distinguished himself and he was just a perfect physical specimen.

And so good-bye to pleasant hospitable Darjeeling with its comfortable hotels, its perfect climate, its Canadian-tennis and lawn-tennis courts and all its civilised amenities: delightful these will be to return to when the job is done. Just now our thoughts are centred on the fascinating experiences ahead, away on the "long road, the road that is always new."

It would be hard to imagine anything more striking than the first week of our march through Sikkim; on March 26th we crossed the Tista River at an altitude of 700 feet, experiencing a shade temperature of about 100° Farenheit: five days later we were on the Jelap La (or Pass), the gateway of Tibet, 14,000 feet higher, with snow on the ground and a piercing wind. For three days we were among orchids, tree ferns and every variety of lush tropical vegetation: the fourth we climbed to 7,000 feet and found ourselves just below the coniferous and rhododendron forest; on the fifth we climbed another 5,000 feet right through this highest forest on to a bare wintry upland largely under snow; successively we left behind the great magnolia trees in full bloom, the brilliant scarlet rhododendrons, the beds of little mauve primulas growing just below the snow, and so to a rest house with double glass windows and a snow drift up to the eaves on the north side.

Beyond the Jelap La we descended to Yatung in the Chumbi valley with real Alpine scenery and a perfect climate at about 11,000 feet: this is Tibet, but by treaty rights we have a trade agency; and

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the hospitable family of Mr. Macdonald, the trade agent, always entertains us right royally on our way through and, with even greater effect, on our way back, when the luxuries of his comfortable house and garden are our first taste of civilization. From Yatung two days brought us on to the real Tibetan plateau; the day we reach Phari has been to me each year the most fascinating day of a fascinating march. Leaving the little rest house of Gautza in a picturesque rocky gorge, all among silver fir and great golden birch trees, you climb by devious ways to a point where suddenly the racing torrent gives place to a winding, pebbly stream bed; the frowning cliffs of the gorge widen to gently rounded hills and, framed in the far end of the upland valley, stands one of the loveliest of snow mountains, Chomolhardi. Gone is the last tree and—at this season—the last sign of vegetation: yet on either hand you will almost certainly see wild sheep (burhel) and Tibetan gazelle: all the birds and beasts are new though destined to become most familiar—for this is the real plateau of Tibet at last. Some hate it and can see in it only what is forbidding, but to many of us it has a charm all its own—the charm of unlimited elbow room, of wide horizons and of emptiness, the charm of colour in strong sunlight.

Across this plateau we were to trek for three weeks amid scenery ever changing, yet ever the same in general character, with the gentle lines of its limestone and sandstone hills, pink or rust red or mauve, lemon yellow or ashy blue; and always on our left hand the horizon is cut by the great wedges of the snow summits, strangely diminished in height from when we first saw them from the south (for we are now 7,000 feet higher) yet now very near and very imposing. After two days of real hard work on stores and transport at Phari we started on the next stage of our march. Our caravan was an imposing one, consisting of some 300 transport animals, yaks and tiny donkeys, the latter as well as the former carrying 160lbs. loads. For reasons connected with the local transport regulations the bulk of the party was compelled to take the bleak and exposed route over that high pass—the Donka La—which lies between the massifs of Chomolhari and Pan Hunri. It has been my lot to cross this pass—or rather series of passes—four times now and I have never done so either in spring or summer without encountering the vilest weather, ranging from a really severe

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blizzard to hail storms, sleet and torrential showers. Marching west it constitutes a rough introduction to the tent life of the plateau after the comparative comfort of the rest houses of the Lhasa trade route which we follow from Darjeeling to Phari.

General Bruce had suffered some inconvenience from the combination of altitude and the sudden drop in temperature when crossing the Jelap La and it was decided that he, accompanied by Hingston and with a small flying column, should follow a less exposed but more circuitous route over the wide plains of Do Chen, to join the main body at Kampa Dzong five days further on. The Donka La let us down easily this year; even so we marched all one day surrounded by mists and driving flurries of snow and all the next, at an average height of nearly 17,000 feet, in the teeth of a bitter wind which, like a toothache, never permitted us to forget its attentions.

En route we were disconcerted to receive a message by runner from Hingston to say that General Bruce had been smitten with a severe go of malaria and was lying up one stage out from Phari. At Kampa Dzong, our next transport stage, our worst fears were confirmed by the news that the General had had to take to a stretcher and so sadly to turn back for lower altitudes at Yatung and on to Darjeeling, definitely abandoning command of the expedition: he lost two stone in weight in two days and there was no question as to the wisdom of Hingston's decision. In an unlucky year this was the severest blow dealt us by an unkind fate. I was now in command, and my first step was to appoint Mallory second in command and leader of the climbing party: from now on he and I—in full consultation with the other climbers, more particularly Somervell and Geoffrey Bruce—elaborated every detail of the campaign ahead of us, and one of my pleasantest memories of the 1924 expedition is the complete accord in which we worked together and the most loyal support he gave me in every turn of the difficult game we were destined to play.

I do not propose to describe the march in detail; for myself I enjoyed every moment of it. Breakfast would be in the open, for the big mess tent started daily at about 7 a.m. on a pair of fleet mules and would be pitched and waiting for us on our arrival at the next stage: at this hour of the morning the sun is hot and that

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"toothache" wind is still, and though the shade temperatures would average about 10° Farenheit, this procedure seldom involved undue hardship. We mostly rode and walked about half and half: our nags were the hardy little 12 hand ponies of the country, and first class little beasts they were. Geoffrey Bruce and I were addicted to the sport of "dog-sticking"—galloping the Tibetan sheep dogs that greeted us savagely from the infrequent villages, until "first spear"—a sound rap with a riding cane—marked the end of the hunt; over the stony plains we sometimes had quite exciting rides and the almost invariable truculence of the quarry was an incentive to push the pursuit home.

Several of us were keen amateur naturalists and the identification of the birds, now in the full swing of their spring migration, was a fascinating pursuit; sketching, photography, geologising, all had their devotees and few, if any, found the long days in the open air anything but a pleasure. Camp was reached any time between 1 p.m. and dusk and, dining about 7 p.m., we were usually in bed by 9. At two or three of the larger villages a halt of a day had to be made to effect a change of transport animals and here much time was spent in haggling over transport rates with the local officials. At halts, as well as on marching days, every member of the party was busy overhauling oxygen apparatus, checking stores, training porters in the use of rope and axe or elaborating the details of the plan of campaign. At Shekar Dzong on April 25th we completed our westing and, turning south, headed straight for our goal; on 26th we crossed the Pang La and from the top of this 17000 ft. pass enjoyed our first close view of the great range of which Everest forms the dominating feature; this view comprises five of the highest mountains in the world, but Mt. Everest being in the centre of the picture, its pre-eminence seems unchallenged. Perhaps its most striking feature is the fact that from its whole nothern face the prevailing N.W. wind has swept the snow, so that the mountain stands a great pyramid of rock projecting above the snowy summits of its surrounding satellites. This fact is a fortunate one for us, for on it largely depend our hopes of ultimate success.

During the latter half of the Great War it was repeatedly my lot to leave a peaceful part of the line or a rest billet in the back areas to take part in one of the great battles of that period. Every

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time I did this I was conscious of the same sensation; there was an inevitableness about it; as if one had been caught in the cogs of some giant machine which inexorably passed one along the successive stages until one was deposited in the thick of a situation where peace and rest were things of the past, or of a dimly possible future. On the last stage of our journey to Everest I was constantly reminded of my sensations during these approach marches—the gradual and progressive keying up of those fiddle strings we call our nerves to meet the inevitable call that was to be made on them, the abandonment of one after another of one's little comforts and amenities and the clearing from one's mind of all considerations except what concerned the immediate task in hand. Ever since Darjeeling it had been my ambition to reach our Base Camp in the Rongbuk Valley by April 29th—two days ahead of our 1922 timing, and so smoothly had our journey across Tibet gone that we arrived punctually on the date in question.

I wish I could give you an unbiassed picture of the Base Camp: it is not an easy thing to do, for my mental picture of it varies with the direction from which I approach it. After the sunny plains of Tibet it seems the last word in desolation; but descend on to it from the greater rigours of the E. Rongbuk Glacier and it seems a very haven of refuge. On the afternoon of our arrival this year there was not much doubt as to which aspect it bore for the moment; my diary records it as "perhaps the coldest day I have known at the Base Camp." It snowed all the afternoon and a bitter wind blew off the glacier whose snout terminates half a mile above camp: the last yak had disappeared down the valley by mid-day and all hands worked like beavers to make a neat and well organised camp out of a vast jumble of stores shed higgledy-piggledy by those same yaks in their hurry to get off. Picture a small amphitheatre of grey shingle and boulders partly filled by a snow bed and shut in on three sides by conical heaps of whitish granite rock, the old terminal moraine of the sunken glacier; of vegetation at this season there is hardly a sign though the eye of faith may detect the possibility of some small patches of grass in the brown stiff bristles surrounding a now frozen spring. Showing dimly through the blizzard some 100 sahibs, porters and retainers are working at store boxes and pitching tents. All are muffled in their full outfit of woollen

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scarves, balaclava helmets, wind-proof overalls and fingerless mits. The campaign is about to begin.

The scene is changed: picture a great basin, perhaps a mile long and half a mile broad, surrounded on three sides by steep walls, its floor one big sheet of glacier. To the north and south the walls are of precipitous rock some thousands of feet high, to the west they drop to a saddle perhaps 1500 feet above the head of the valley, though actually the slopes leading to the Col are, so to speak, the headwaters of the basin; for the ice descends in the form of a hanging glacier from the very crest in a series of steep snow slopes and cliffs of blue ice—a formidable glittering wall looking for all the world like the icing of a great Xmas cake. Between the southern edge of the basin floor and the steep rock wall which bounds it is a narrow strip of jumbled moraine.

The whole scene is the very picture of utter desolation: it is composed of three elements only, snow, ice and rock and at first sight there is not one living thing, animal or vegetable, to be seen; the whole basin is a whirling cauldron of driving powdery snow; the air is thick with it and the violence of the wind is such that it is hard to pick out any of the features of the landscape through the swirling eddies which come—heralded by a crescendo roar—alternately from every point of the compass. Look closely and huddled on the moraine strip on the south of the basin you will see a little cluster of six or eight tiny green canvas tents six feet square by three or four feet high, their sides lifting and falling, flapping and banging in the hurricane. Open the end of any of these tents and you will see inside either two or three motionless bundles, completely covered with perhaps half an inch of the finest snow powder. These are the six sahibs and some eighteen porters who have arrived during the last three days: you will see no spare clothes lying about round the bundles which represent 6 lb. eider-down sleeping bags—for the figure in each bag is fully dressed bar his boots, and these, to avoid freezing, are tucked into the head of the bag.

This is Camp III and it is the morning of May 10th. Five days ago Mallory and Irvine arrived here with 18 or 20 porters and established the camp on its old site of 1922. For two days they

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remained weather-bound in Camp with night temperatures of as much as 22° below zero and with insufficient food and bedding. Two days ago these 18 porters were returned to Camp II, three or four miles down the glacier, temporarily exhausted and knocked out by cold. Yesterday their place was taken by a similar party from Camp II escorted by Somervell, Geoffrey Bruce, Odell and myself. This morning it is decided that Mallory and Irvine also have had enough of it and they are dispatched back to Camp II to recuperate. The day is spent by the remainder in trying to improve the comfort of the camp and in bringing up some 16 loads from a dump a mile down the glacier. The night of May 10th was a repetition of its predecessor and it was decided next morning to evacuate all three camps of the E. Rongbuk Glacier and to retire the whole party to the base for a period of recuperation before again advancing to the attack; the fact that the route to the N. Col—the hanging glacier already described—must inevitably be subject to avalanches and in a dangerous condition for some days contributed to a decision to which the condition of the porters already pointed.

I shall not in a hurry forget the hours' work which preceded the retreat from Camp III. We all had our jobs; mine was to check and collect certain stores and this entailed standing in the open making lists in a note-book: the wind was blowing a full gale and at 9 a.m. the thermometer stood at -1° F.: It was necessary to dive periodically into a tent to restore the circulation to numb fingers. Geoffrey Bruce had the hardest task, for he had to induce the comatose porters to bestir themselves, strike and pack all tents and pile stores into a central dump. I can see his figure in my mind's eye as I write—motionless on a big rock in the middle of camp, his back, turned as it was to windward, one cake of driven snow and I can in fancy hear his sharp decisive words of command in Nepalese. At Camp II we found a porter with a broken leg due to a fall on the glacier, and another with very badly frost-bitten feet and legs. Next day at Camp I we found one of our Gurkha N.C.O's lying at death's door from some form of cerebral hæmorrhage and on May 12th the whole party was again collected at the Base Camp. The N.C.O. and the frost-bitten man both died later.

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So ended Round I. It was short and rather disconcertingly sharp, for nothing we had encountered in 1922 had led us to expect such an experience; none of the sahibs were much the worse but we afterwards realised that the moral effect on the porters was probably greater than we had supposed at the time. On the credit side we could count the complete establishment of Camp III and the fact that one more carry up the glacier would fill it with all requisite stores for the higher camps still to be established; an abortive attempt by two climbers had been made to reconnoitre the route for this year to the North Col—a route that must inevitably vary from year to year as it is all on glacier—but this had not accomplished much.

Some of my readers will be disposed to wonder why temperatures no lower than - 22° Farenheit should have so affected us and our porters. The explanation of this is the factor of altitude. It must not be forgotten that from Phari to the Base Camp we had lived at an average height nearly equal to that of the summit of Mont Blanc; even such an altitude produces a quite considerable amount of discomfort—though hardly more. From the Base Camp to Camp III the rarity of the air begins to have much more serious effects. If a cinematograph picture of life at these heights could be run off at the same rate as that at which it was taken the most striking impression it would give would be the languid movements of everyone—particularly the European members. Above 17,000 feet brisk movements begin to be impossible: pace uphill is very seriously affected and, further, appetite, power of sleeping and one's whole physical well-being begin to suffer. Resistance to cold is very much reduced in consequence and even at 21,000 (the height of Camp III) a party of climbers starting out in the early morning—the time of day when vitality is at its lowest—would convey somewhat the idea of a party of hospital convalescents starting on their first out of door walk after a week or two of severe influenza: I may add that this simile also exactly describes the sensations of the climbers themselves.

Round II started with a second advance from the Base Camp on May 17th—the day, which, as we had originally hoped, should have seen our first attempt on the summit. Once again the scene is Camp III and the conditions very much as in my previous pic-

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ture: it is the evening of May 23rd; snow is falling heavily and the outlook from camp is confined to occasional glimpses of the amphitheatre that surrounds the glacier basin; the summit of Everest, which should appear over the great shoulder of the mountain rising from the N. Col, is blotted out in driving snow and cloud.

Misfortune has continued to dog our footsteps. We started well enough. On May 20th Mallory, Odell and I did a successful reconnaissance of the new route to the North Col, a route designed to avoid a repetition of the avalanche which, in 1922, swept away a party of sahibs and porters and killed seven of the latter. With this view the dangerous snow corridor in which the avalanche occurred was avoided and a route selected which, by following the lower lips of crevasses, joined the same corridor near its top and so largely avoided the concave snow slopes which are the principal source of danger from avalanches. This route was longer than the more direct route of 1922 and involved considerably more real climbing, particularly at one point where an ice fissure or chimney ran nearly vertically upwards and threatened trouble when tackled by laden porters. The last stage of the ascent before arriving on the snowy shelf which has for two years provided a site for Camp IV was an exceedingly steep snow slope with a big ice cliff below. No means of circumventing this could be devised and it remained—and probably always will remain—the most dangerous section of the whole mountain.

Next day, Somervell, Irvine and Hazard escorted 12 porters up the new route, performing prodigies in getting the 12 loads to the top of the ice chimney; these were pulled straight up the face of an ice cliff adjoining the chimney, principally by Somervell and Irvine—a three hours' task and a really fine performance. Somervell and Irvine returned to Camp III while Hazard established Camp IV where he was to remain until relieved next day by Odell and Bruce. But next day it snowed from morning till night and there was never any question even of starting.

On the 23rd, after the coldest night ever recorded on Mt. Everest -24° F., Bruce and Odell started with a convoy of porters in fine weather, but before mid-day it had again begun to snow heavily and the party had to turn back owing to dangerous condi-

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tions after making a dump of stores half way up. On their return they reported that they had seen Hazard and some or all of his party of porters descending through the snow above them. This brings me to the point at which I started to describe Round II. Somewhat depressed by Geoffrey Bruce's and Odell's reverses and by the weather we waited anxiously for the arrival of Hazard; we were in complete accord with his action in descending with his party from Camp IV—no place in which to be caught in what we all took to be the beginning of the true monsoon. At dusk he arrived and a few rapid questions elicited his story; he had only eight men with him. While he had gone ahead to be the first to test the dangerous topmost traverse, the last four men had funked it and, turning back, had remained at Camp IV: they were short of food, for one vital load had been dropped over a cliff on the way up two days before; one at least of the maroons was reported frost-bitten.

The situation had suddenly assumed a very serious aspect; these four men must be got down and that no later than next day, for who could say if they would be fit to walk even then, let alone later? The snow was falling more heavily than ever and was now of that soft feathery consistency which makes for danger on the steep slopes of the North Col and is usually only associated with the soft monsoon wind. Once again it was evident that any attempt to climb the mountain must be abandoned for the moment: only vital necessity could justify any attempt to approach the North Col under these conditions—and, further, all at Camp III were by now in a bad way. Cold and exposure and the exertion of climbing at these altitudes in deep, fresh snow had had a disastrous effect on the health of the whole party. In an attitude of something very like gloom the plans for next day were made by the light of a candle, with the soft pattering of the snow playing a depressing accompaniment on the walls of the little tent. Mallory, Somervell and I were to go up and fetch down the four marooned porters if we could (and we thought it a big if); Geoffrey Bruce was once more to carry out the evacuation of Camp III and to reoccupy the lower camps of the E. Rongbuk glacier, leaving Noel and Odell at Camp III to look after us on our return.

No one who saw our start at 7.30 next morning would have rated our chances of success very high for, as we crawled up the

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moraine and glacier above Camp III, we were a sorry looking trio: I remember well my own feelings as I conned over and over again our hopes of success. The possibilities that one or more of the porters would be too maimed by frost bite to walk (I carried a patent sick man carrier on my back in case of the worst) or that we should either give out from exhaustion or meet with an avalanche before reaching them were only too obvious. But happily on Everest one has a knack of recuperating and of going better as the day goes on; a bitter cold night after the snow stopped falling about midnight put a different complexion on the avalanche question and, as it turned out, the only seriously frost bitten man was affected in the hands and not in the feet. To cut a long story short—and it was a *very* long story—4 o'clock found us at the foot of the final steep traverse below Camp IV, with the four porters waiting at the other side.

Somervell here claimed the post of danger and honour, and so Mallory and I belayed the rope from behind and he crossed the steep and dangerous slope while we prepared to hold him when what appeared the almost inevitable slip of the whole new surface of snow occurred. Going very slowly and carefully, stopping continually to cough and pant, Somervell reached the extreme end of the rope and found himself still five or ten yards from the shelf where the waiting porters were gathered. Time pressed, we were already in cold shadow and there was no alternative route. The men were instructed to cross the short intervening space one by one and with the greatest care. Two reached Somervell safely, one had already been passed across the taut rope to Mallory and me when suddenly the last two slipped together and for a second, with our hearts in our mouths, we watched them fly down the almost vertical slope to certain destruction where, at the bottom, it ended in a great cliff of blue ice. But by a miracle they pulled up in perhaps 10 yards; the cold night and a day's hot sun had bound the new fallen snow to a holding consistency.

Somervell's handling of the situation was masterly; very coolly he despatched the second man across the rope to us; he shouted to me "what is Nepalese for 'sit still' ?"; I supplied the phrase and while the two shivering men sat like statues Somervell chaffed them and in fancy I can hear now the short and involuntary bark

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CAMP IV LOOKING NORTH.

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of laughter one of them gave. Next he drove his ice axe nearly to the head in the deep snow and, taking the rope round it, strained it so tight that, while we payed it out to our extreme arms' length, he could hold it in one hand by the very end and just reach the two men with the other. One by one he pulled them up by the scruff of the neck and passed them across to us: he then rejoined us and it was a lesson in mountain craft to see him walk upright and firm over the series of sliding patches to which the porters had reduced his original steps as they wriggled across clinging to the rope. At perhaps 5 p.m. we started down, the rescued men roped to us. Shaken or frost bitten as they were they were not an easy party to conduct down a route that, never easy, was under the prevailing conditions more formidable than usual. We reached Camp III long after dark: I should like to finish the story by saying that we slept the sleep of the just, but speaking for myself, I slept very little: my feet had never been warm all day and refused to warm up in my sleeping bag and I remember that my satisfaction at a successful day's work was much tempered by my anxiety about the obvious difficulties that still lay before us, with the major portion of our task still to do, a sadly weakened party to do it and Everest apparently possessed of a devil. Two days later we were all collected at Camps I and II, for time was now too short for a retreat to the Base Camp.

So ended Round II. There was no blinking the fact that we were badly shaken up. Half the climbers—particularly Mallory and Somervell—had very bad sore throats and could only speak in a whisper, many were below par in other ways; all had lost much weight and were really fitter for a rest cure at lower altitudes than for a resumption of hostilities on the mountains. Worse still the *moral* of the porters was at a low ebb and a careful estimate by those of us best qualified to judge put the total number that could be counted on to reach even the North Col at 15 out of a total of 55. At Camp I we held two lengthy conferences and only after much discussion did we arrive at a decision. Our original plan had been based on the principle of a simultaneous attempt by two parties of two, one with and one without oxygen: these parties were to be independent but mutually supporting. But we now found it necessary to substitute a very much simpler plan—for neither the probable

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time available before the advent of the monsoon, nor the sadly reduced number of porters on whom we could now depend to reach even Camp IV at 23,000 feet justified anything complicated. In the end it was unanimously decided to make a series of attempts without oxygen by parties of two climbers starting on consecutive fine days. Mallory and Geoffrey Bruce were selected as the first pair, Somervell and myself as the second; Odell and Irvine were to be in support at Camp IV, Hazard at Camp III; Beetham was *hors de combat* with a severe attack of sciatica.

And so the scene changes once more; throughout the final phase—the third and last round—the weather remained as good as one has any right to expect on Mt. Everest. It was as if the mountain had made all the effort it considered necessary to defeat the midgets which buzzed so persistently about its flanks; now it sat back and smiled at their puny efforts, secure in the knowledge that it had already done enough to ensure their failure. In such weather Camp IV was no bad place. Picture a narrow ledge of snow, overhung on the west by an 80 foot wall of blue ice, and dropping on the east in a tremendously steep snow slope merging, close below, into ice cliffs—north and south tower the North Peak and the great N.E. shoulder of Mt. Everest from which the camp is separated by a confused jumble of ice cliffs, hummocks and crevasses: through these a devious and tricky route leads to the North Col itself some quarter of a mile away.

At Camp IV the world is narrowed to two elements only—ice and snow: our half dozen tiny tents are pitched on a hog back of snow so narrow that one has to prop a rucksack under one's head for a pillow where the shelf begins to drop steeply to the abyss leaving not even six feet of level sleeping room. The camp is sheltered from the prevailing west wind by the ice cliff overhanging it and for some eight hours of the day it is in blinding sunlight. At 4 p.m. the sun leaves it and it becomes bitterly cold.

Hence on June 1st, Mallory, Geoffrey Bruce, and six porters carrying 20 lb. loads disappeared among the jumbled snow hummocks leading to the Col—the pioneer party of this year's high climbing. About 3 p.m. the heads of Somervell and myself and six more porters appeared over the steep approach from below. Odell and Irvine allotted tents to each successive party and spent almost

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the whole day melting snow and cooking—and only those who have done this hateful job can appreciate what we owed to our "supporters." Soon after our arrival two porters from Mallory's party hailed the camp from the Everest side of the Col, and Odell went out to rope and escort them in across the crevasses and dangers of the intervening quarter of a mile; these men reported Camp V established at about 25,500; there they had left the upward bound party to sleep, with the remaining four porters who, next day, were to carry on the equipment to form Camp VI. So far good: but they also reported that the wind on the exposed N.E. arête of the mountain had been strong and bitterly cold, and had seriously affected all the porters.

Next day, June 2nd, Somervell and I with six porters followed in the footsteps of the first party; only two or three hours after our departure however the first party arrived back in camp, after meeting us en route. On waking that morning at Camp V it had been found that not even Bruce's command of the language and great influence over the porters could induce any of the four who had slept there to go on to Camp VI; the wind on the previous day had taken the heart clean out of them. In addition Bruce had strained his heart helping porters to carry their loads the last 500 feet into camp and was obviously unfit to go high.

But Mallory was still fit and he was not the man easily to give the mountain best. Some instinct seems to have warned him that Somervell and I were also doomed to failure and he rightly judged that if by hook or by crook the necesary porters could be scraped together the only remaining chance was a last attempt with oxygen. It must not be forgotten that Mallory had already born the brunt of all the heaviest climbs up to date; the first reconnaissance to the North Col, the gruelling day when the porters were rescued, and now a climb to 25,500 and a night in that delectable spot Camp V. Few men but he could have done what he now proposed—perhaps none; but George Mallory was possessed of a spirit which, on these occasions, rose triumphantly superior to the flesh:—"If you can force your heart and nerve and sinew . ." So on June 3rd he and Bruce went down to Camp III and there collected the absolute minimum of porters necessary to stage an exceedingly modified form of oxygen attempt, and on June 4th he again returned to Camp IV.

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Let us take a brief glimpse at what is happening 5,000 higher up. At mid-day on June 4th the great northern face of the mountain is bathed in sunlight and singularly free from wind—as good a climbing day as is ever likely to be met so high up. Somewhere about 28,000 feet and approaching the big gulley which divides the final pyramid from the eastern shoulder two ant-like figures are crawling painfully and laboriously upwards and to the right. For 10,000 feet they are the only living things in sight and look curiously out of place on the great wilderness of rock and snow, where no living being has ever moved since the great range of the Himalayas was first heaved up from the primæval sea. The two figures are Somervell's and mine and it is fairly evident that they are nearing the limit of their powers. The going is all on rocky slabs and scree, inclined as such an angle that a slip would send a man shooting down the convex slope to where, ever steepening, it plunges onto the head of the Rongbuk glacier 10,000 feet below; every dozen upward steps the climbers stop, bent forward with elbow on knee, to pant and rest, and then struggle on another dozen paces; every ten minutes or so they sit down for a longer rest; sitting thus in bright sunlight they will be seen to shiver and quake with cold though dressed in complete wind-proof clothing, fur caps and long fingerless mits, and this on a day when the west wind is unusually kind. Every now and then they glance upward and discuss the onward route in husky whispers, broken in the case of Somervell by continual fits of coughing; every detail, almost every stone, of the summit only 1,000 feet above can be clearly seen, and tantalisingly close it looks—tantalising because the pace of the climbers makes it pretty evident that the prize is not for them.

That night at dusk the three at Camp IV anxiously watching the N.E. *arête* of the mountain saw our two figures slowly descending in the vicinity of Camp V, 2,500 feet above, and as darkness fell our electric torch could be seen wavering on the big snow bed above the Col. Mallory and Odell, preparing to sally forth and meet us, hailed us to say that they were bringing out an oxygen apparatus. My feeble wail in response was interpreted as conveying that we didn't want the d . . . d oxygen, we wanted drink—whereupon young Irvine got busy with the primus stove and brewed drink for dear life.

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I shall not quickly forget the welcome we got when Mallory and Odell met us some 100 feet above the Col in the freezing darkness, their generous congratulations on our climb to about 28,100, nor how they fed and looked after us in camp on our arrival, about 9.30 p.m.—a sufficiently striking contrast to the occasion two years before when, at 11.30 p.m., Mallory, Somervell, Morshead and I reached the same camp to find it empty and deserted and, as we thought, deficient of the cooking apparatus on which we depended for our drink—the invariable crying need of those who have been high on Everest. This night as I shared a tent with Mallory and went over with him his plans for the last attempt, for which he had selected Irvine—the arch expert on oxygen—as his companion, I was smitten with snow blindness, the penalty for having dispensed with my snow goggles high up on the mountain that day; the fact that I had only done so when on rock gives a good idea of the glare of the sun in the rarified atmosphere of great altitudes.

Next day—June 5th—was spent in completing plans for Mallory's and Irvine's climb: I was quite blind and had to be led about and fed like a baby. In the afternoon Somervell descended to Camp III and Hazard arrived to take Irvine's place as supporter with Odell at Camp IV. The entry in my diary for June 6th runs:—"Still stone blind after a night of pain. Mallory, Irvine and party got off about 7.30. About 10.30 Hingston, Nima Tundoo and Chutin arrived to look after me. Decided to go down to III stone-blind as I was. Hazard escorted and roped me as far as the bottom of chimney and the other three the rest of the way—a notable performance on the part of Hingston. Was carried into Camp III from edge of glacier down the moraine on one-man-carrier and got in about 4.30 p.m."—a bald account of an eventful day. The handshake which was all I knew of my last good-bye to my friends; the arrival of Hingston, our medical officer, who had never before done any real climbing and who yet with the help of Hazard's rope and two Tibetan porters held me in safety, placing my every footstep down 1,500 feet of a formidable ice and snow climb; the wearisome mile down the rugged frozen moraine of the glacier carried on the backs of six porters, turn and turn about; and the kindness of all at Camp III; certainly a day not easily forgotten!

And so it is from Camp III that I watched the final scene of the drama. But what a different Camp III! In place of a sheet of

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snow, sun-baked rocks; meals eaten in the open; and the view, in place of a whirling flurry of snowflakes, that of a tremendous amphitheatre of rock and ice cliffs crowned by the final pyramid of Everest clear cut against a deep blue sky. Here Bruce, Noel, Hingston and I spent the next four days. My eyes quickly recovered but were not fit to stare at the mountain. Every other eye in camp, supplemented by telescope and binoculars remained glued from morning till night on those portions of the route where we hoped to see something of the climbers. On the evening of 7th a message from Mallory, sent from Camp VI at 26,800 feet by the hand of a returning porter, told us that they had reached there that day in good form and warned Noel to be on the look out for them with his telecinema camera at the foot of the final pyramid (700 feet from the summit) at 8 a.m.—an optimistic message which cheered us greatly. On the 8th the weather changed: snow fell high on the mountain and its top 3,000 or 4,000 feet were wrapped intermittently in soft-looking clouds.

Then towards evening of 8th began our long drawn out anxieties. Odell, bent on geology, had followed one day behind the climbers, and this day—8th—reached Camp VI about noon; we later heard his dramatic story of how he had seen the last glimpse of them on the ridge at about 28,200 feet—but over five hours late by Mallory's optimistic estimate. Odell's figure descending in the sunset light we picked up and recognised several times—but, despite some false alarms, night closed down without our seeing any sign of the other two climbers—nor did our sentries, who watched the mountain for several hours after dark, see any light either at Camps VI and V, or wandering about on the north face. So far there was no necessity to assume a tragedy, for the climbers might well have reached one of the high camps unseen by us before dark. Nevertheless we went to bed with forebodings of the worst.

By eleven next day, nothing had been seen of the two and we decided that everything pointed to a disaster. Bruce and I were utterly unfit to attempt any further climbing. A message was sent to Odell with instructions to search as far as Camp VI, but no further, if he or Hazard were fit to go, and arranging a code of signals to be made with blankets on the snow to indicate the results of their search. Soon after our messenger started for Camp IV

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we saw two figures leave that camp for the mountain and thought we could recognise Odell, and in this we were right: anticipating my instructions he had started for his third ascent above 23,000 in seven days accompanied by the last remaining available porter.

For the rest of this day and all the next we at Camp III continued to watch the mountain. All hope of the return of Mallory and Irvine was now dead; but not so our anxieties, for now we had to think of Odell and those still at Camp IV (Hazard and 3 porters), and this was one of the worst days we had seen on the mountain: the wind was very bad, blowing the snow in every direction at once, and we anticipated the first snowfall of the real monsoon at any moment, with its fatal effect on the slopes below Camp IV, cutting off the survivors on the mountain from safety. About 2 p.m. on 10th we saw figures moving near Camp IV and realised that they were laying out one of the blanket signals we had arranged; a cross—"no sign of the missing men at Camps V or VI": Odell had similarly signalled down from Camp VI. Towards sunset we saw his figure once more descending the ridge and later arriving at Camp IV. Next morning Camp IV was safely evacuated.

Five or six times now have the anxious watchers at Camps III and IV seen the little black figures of returning climbers descending that long ridge. Perhaps the next time this happens will be the last—for once Everest has been climbed I doubt if anyone else will be found to tread that lonely road for the pleasure of it; and when the fortunate men who have reached the top come down the ridge again I wonder if there will be something in their gait which will tell those who are watching them that they have won. I should like to be there to see it!

It is four days later—June 14th—and mid-day. The scene is once more the Base Camp. Outwardly at first sight there is no change in the grey moraine heaps: but the snow bed has gone and if you look closely among the scree and boulders you will find a number of minute flowering plants; there is a hint of fresh green in the little patch of prickly grass; it is high summer in the Rongbuk valley. The tail end of a small convoy of laden yaks may be seen disappearing among the hillocks of old moraine half a mile down the valley; the Base Camp itself has gone and the last Sahibs, who have stayed to see the final loads

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despatched, turn back for a last look at the familiar view of Everest blocking the head of the valley ten miles away. The mountain looks deceptively peaceful and friendly, there is little wind and only a few fleecy white clouds: these are hardly moving but they *are* moving—and from the south-east, a significant sign, for they are the forerunners of the monsoon which actually broke here next day.

Silhouetted against the mountain and standing on a conical mound overlooking the site of the dismantled camp is a rough obelisk some fifteen feet high built of rounded glacier-worn boulders. This is the monument built in the last two days to commemorate the names of three Englishmen and nine Tibetans or Nepalese who have lost their lives in three years' attempts on Mt. Everest. The last two Sahibs move slowly off after the yaks. Their movements are not very brisk for they are "all in"—as those must be who have faithfully done their best on Everest.

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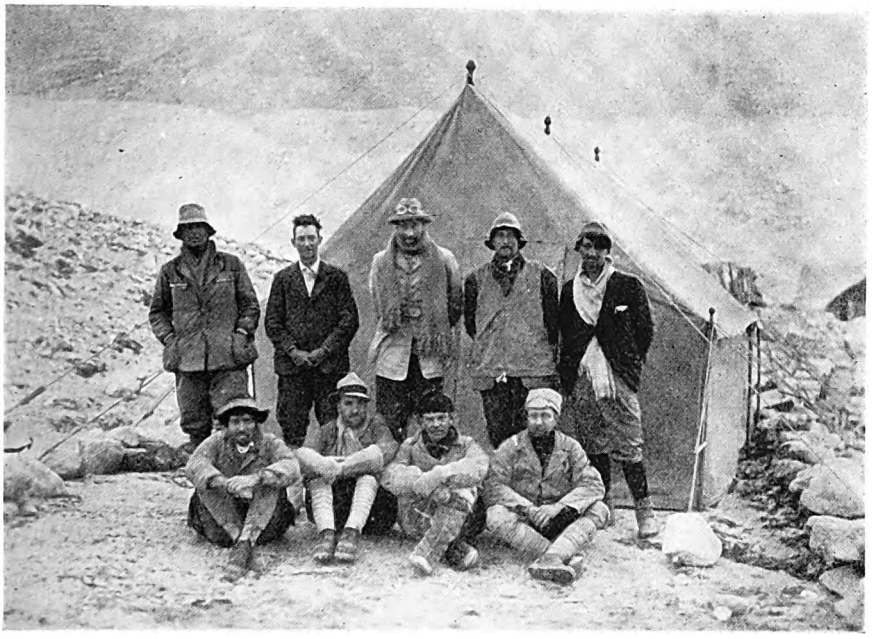
GROUP AT BASE CAMP.



Standing: Irvine. Mallory. Norton. Odell. Macdonald.
Seated: Shebbeare. G. Bruce. Somervell. Beetham.

"The last two Sahibs move slowly off."

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EARLY DAYS IN RAJPUTANA.

By "O. B. E."

IN the Journal of the Royal Artillery for January, 1925, there appears an article called "The Big Bagh at Chansa," which tells of the excellent pigsticking there was near Delhi some thirty years ago. The story has set me thinking of my early days in Rajputana, and wondering how the sport now obtainable there compares with that of my time, 1896—1900. The battery in which I was a subaltern marched from Kirkee to Nasirabad; it may have been that we were inexperienced, or easily pleased, but Rajputana appeared to us a very paradise for cheap sport. Small game shooting, duck, snipe, the greater bustard, houbara, floriken, sandgrouse, quail, etc., kept one going from the end of July till March 15th when the hot weather began. Black buck and chinkara were plentiful, and with some moderate pigsticking, and hunting jackal, foxes and hares with a bobbery pack we were kept amused all the year round.

Then there was the romance of the country which appealed to a young soldier, as it was a record of centuries of fighting, and of the heroism not only of brave Rajput men, but of beautiful Rajput women. Our sporting trips put us in touch with the "thakurs" or country gentlemen, delightful people whose sporting instincts were much the same as those of our own county folk, except that hog-hunting instead of foxhunting was their main form of sport. As we marched into Rajputana from the south one of the first places that we camped at was Chitor—and Chitor is probably fuller of tales of fighting and romance than any place in India. Our camp lay about a mile and a half from the old city which is situated on a long low ridge about 300 feet high and three miles long. Two high towers and the tops of buildings seen against the skyline give a curious effect not unlike that of a huge battleship standing up in the plain. There were three famous sacks of Chitor, between the years A.D. 1300 and 1568 when it was the capital of Mewar. After the third sack it remained ruined and uninhabited, Udaipur becoming

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the capital. Colonel Curzon Wyllie, the Resident, happened to be in camp at Chitor when we marched in, and so we were told something of the story. He also told of a wonderful book—Tod's "Rajasthan," where we could, and did, learn more of the romance of Rajput history.

A few days later we reached a place called Bhilwara, where we carried out our annual practice—and here we made the acquaintanceship of the Rao Saheb of Meja, who asked us to shoot pig. When we suggested hunting them on horses he said it was impossible as they would never break from the high hills. However, we decided to try, though when we saw the hill he proposed beating it certainly seemed unlikely that pig would break. As it happened there were two factors which worked in our favour. First the babul jungle at the foot of the hill was fairly thick and the pig were in the habit of making for the rushes fringing a very large tank at Māndăl about two miles distant, where they often lay up all day. Secondly, as soon as they heard a gun go off in the beat, the pig who evidently had been heartily shot at in the hills, judged it safer to make for the plain. Anyway we were rewarded by one or two very good hunts, and the death of a boar or two.

I have not the space to dwell on the many delightful places where we shot and hunted in Rajputana, but to my mind Jodhpur excelled them all. It was a complete education to go to Jodhpur and see the enthusiasm for sport that obtained there. Every Christmas there was a pigsticking competition and polo tournament. It was obvious that pigsticking came first as it was no unusual thing to meet in the streets of Jodhpur a tushless old boar whose business it was to poke about in the stables and try to steal the horses' grain, and so teach them to be staunch to pig. Sir Pertab Singh, then Administrator, Harji (Hari Singhji) and Dhokal Singh, all very fine polo players, could be seen most mornings watching gallops or the training of ponies. They dressed much as we do for riding, Cawnpore pith sun hats, a plain drab coat, and Jodhpur breeches for exercising, butcher boots for pigsticking. They were always most kind to soldiers and Sir Pertab never seemed to forget anyone who had been to Jodhpur.

Two of us subalterns at Nasirabad went to one of the Christmas meets, but our slow horses and indifferent ponies were quite out-

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classed and we were soon out of the hunt. At any rate we were fortunate enough to be introduced to the "Súr Sagar" the cream of the Jodhpur pigsticking meets. The Súr Sagar was a plateau entirely surrounded by rocky, cactus clad hills, and here again there appeared to be no reason why pig should ever enter the plain except to feed at night. There were a good many babul trees on the plateau and somewhere about the middle a walled in patch of cultivation, or "bagh." Now the reason that pig ever remained in the plain after dawn was that they were educated to do so. During the late hours of the night men mounted on camels put down grain which the pig found and ate, and grew accustomed to the camels moving about. The "sowars" (or mounted men) put the grain down a little later each night until at length the pig grew bold enough to remain out after daybreak. We had to make a very early start to hunt the Súr Sagar. We were called at 4 a.m. and at 4.30, well wrapped up as it could be bitterly cold, were driven out to the meet. The last part of the road up into the hills was a sort of causeway of sheet rock, and one wondered how the ponies scrambled up it at all in the pitch dark. We mounted at the top of this road and rode down to the "bagh" where we waited for the pig to commence their leisurely retreat to their rocky fastnesses. Camel sowars were not actually beating, but rather moving the pig quietly in front of them. Such was the "Súr Sagar" and the mode of hunting it.

I have vivid recollections of one morning there in March when a brother subaltern and I were staying with Colonel Curzon Wyllie, the Resident, and Sir Pertab had two men from England staying with him. We were divided into two parties: Sir Pertab, "Harji," B. and I, one; the Thakur of Berya (I think), Col. Wyllie and Sir Pertab's two guests the second. Our party was posted close up to the wall of the bagh well before daylight. In the dusk of the morning a huge sounder of pig with several boars passed by us, and after being given enough law to prevent them from breaking back, Sir Pertab told us to ride. Off we went, I was riding a white horse, a trooper in "my cavinry" (as Sir Pertab called the Imperial Service Lancers), and a right good one he proved. There was no time to look at what the others were doing. I picked out my boar

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and speared him just as he jinked across me to the left. A rap, a scramble, a splintered spear. A mounted syce very quickly produced another spear, a shout from Harji to say the pig was dead, and on in pursuit of the others who had also killed a boar. By this time we were nearing the hills and the cactus and rock and B. had speared his second boar and presently this boar, sorely wounded, was clambering up amongst the cactus bushes. I can remember his end so well and see his little evil gleaming eye as, transfixed by Sir Pertab's spear, he was trying to work his way up to use his tushes. A short halt—now broad daylight—and we rode across to the other party who had also accounted for three boars. We then all proceeded to ride back quietly towards the rendezvous. We were to get one more boar, as one venerable patriarch of the porcine tribe had become even more careless about getting home before daylight than his brethren, and we were destined to meet him and kill him at 8 a.m., the spear falling to Colonel Wyllie. Seven pig between 6.30 and 8 a.m.

Those were happy days. Jodhpur too had its fort and its romance, and perhaps one of the most pathetic things was the sight of the imprints on the lintel of the palace door of the little hands of maharanis as they left to be burnt alive with their dead husbands in the days (not so long gone) when "sati" was practised.

In my reference to the sacks of Chitor, I told how a new capital of Mewar had been established at Udaipur. This is a beautiful place built along one shore of a big lake. There too excellent sport in the way of tiger shooting was to be had by the privileged, though not by the subaltern. Tigers were very strictly preserved and the marahana was supposed to have given strict injunctions to his own nobles that they were on no account to shoot one in a beat—they could shoot pig, with which the hills around swarmed. One of the most amusing things to do at Udaipur was to drive out to a high tower in the scrub at one end of the lake, and see the wild boar fed. At 5 p.m. daily a horn was blown, and then mealy cobs or grain of sorts was thrown from the tower. Pig evidently were waiting for the signal, and hundreds came trotting along to eat up the grain. I only saw this once and on that occasion the pig were very rude to one another in their anxiety to get at the corn cobs, though I never actually saw an old boar use his tushes seriously

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on the smaller fry when hustling them out of his way. When the pig had settled down to feed an outer circle of peacock and jungle fowl formed round the jostling, struggling pig, and a cloud of dust stood up over the extraordinary scene.

Beyond a three days' stay to play cricket against the boys' college there I never was at Udaipur in my young days, but stayed at the Residency about ten years later and renewed my acquaintanceship with one of the boys who had taken part in that match. I remembered him as a slow bowler who broke to the off and got me caught at cover. On this latter occasion he was playing badminton at an afternoon party, a big stout man, bewhiskered and bejewelled, two daggers stuck through his cummerbund, a sword in its velvet sheath lying on a chair whilst he did great execution with a badminton racquet. His eyes lightened up when I reminded him of Colonel Pinney and the matches against the boys, but he sadly said that they no longer played cricket.

Eheu fugaces. Times may have changed but are the days of romance dead? Certainly not; and when young fellows decry India they surely make a mistake, since, in spite of altered conditions, politics, etc., there is no doubt that sport and romance are still to be found there, and without these what is life after all?

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THE KADIR CUP MEETING, 1925.

BY "NEMO."

ALL the enjoyment was taken out of this year's "Kadir" by the sudden death of Lord Rawlinson two days before the meeting was due to begin. Our late Chief was devoted to pigsticking: his annual Christmas cards always included a picture of the grey boar painted by himself, he was President of the Delhi Tent Club and always made a point of attending the Kadir. This year, within a fortnight of his death he told the writer how much he was looking forward to seeing the meeting and discussed the chances of several of the competitors. So, when his illness took its sudden and fatal turn the first thought of the Meerut Tent Club was to abandon the meeting. It was, however, realised that with all the arrangements made, all the elephants, the horses and many of the competitors assembled, such a course would not only be financially disastrous but would never have met with the Chief's approval. It was decided therefore, to postpone the meeting until after the funeral ceremony in Delhi and then to hold it quietly, without the revelry and good cheer that is always one of the principal features of the meeting.

The Kadir has been described by Major-General Wardrop in his "Modern Pigsticking" with more graphic detail than the writer can hope to emulate, and as every Gunner Mess must surely possess a copy of that book, the writer will merely attempt to give some first impressions, and a short account of some of the heats. The competition takes place over miles of sun-dried river bed, covered with grass and "jhow," the latter a dark green plant something like broom. The grass is wiry, averages about three feet in height and is in places very thick. The going is sound and, generally speaking, a good deal easier than what one usually has to gallop over when hunting the boar. The camps are pitched on the edge of this huge field of waving grass, in groves of mango trees which afford excellent and much needed shade for the tents. There is the main camp,

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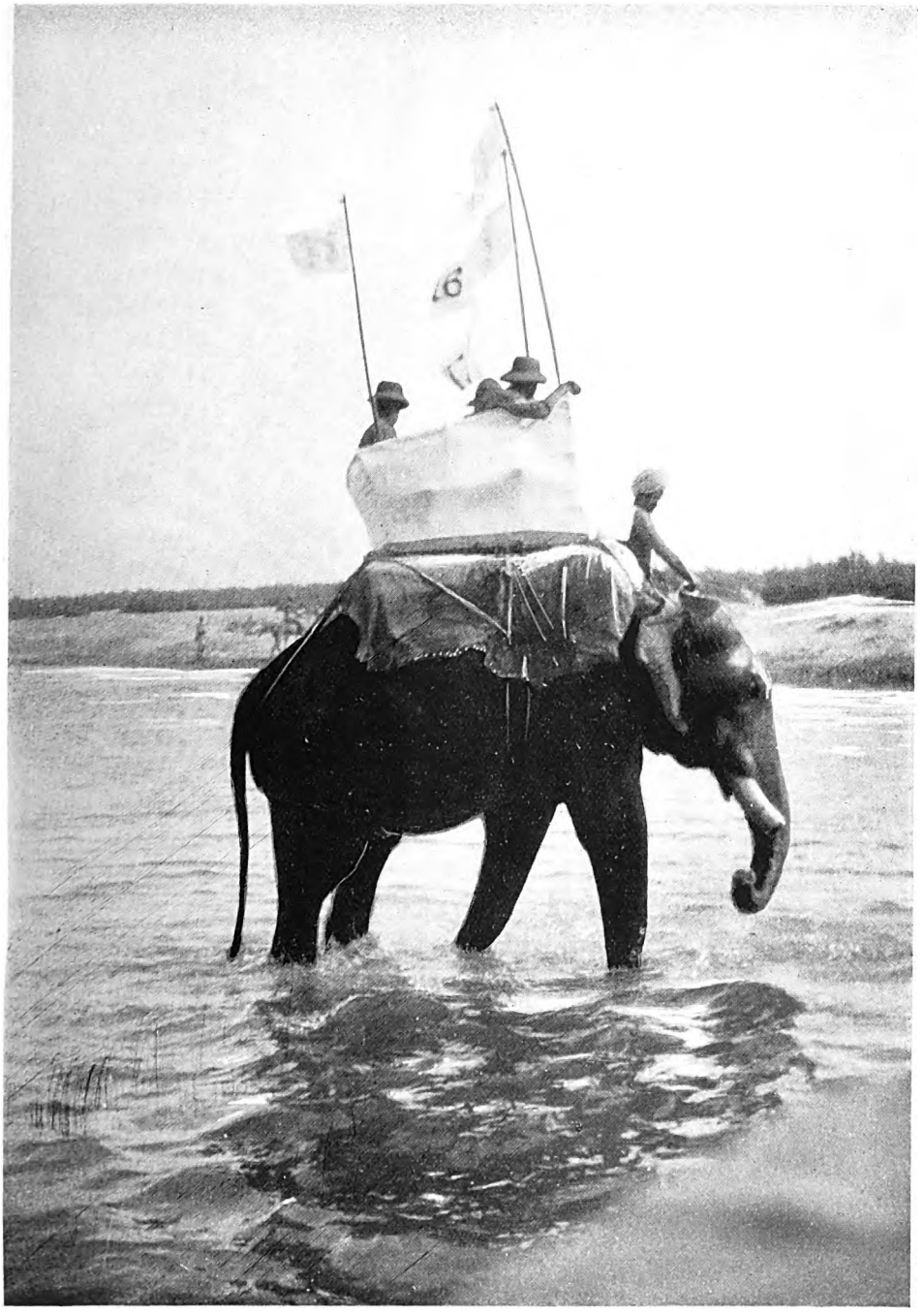

The flag elephant. On the flags are shewn numbers of the heats and the winners.

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where live the bachelors: close by is the horses' camp, then the elephant camp and away by itself the "Ladies' Bagh" where the married competitors and spectators pitch their tents.

For a week before the meeting the Hon. Secretary, who corresponds to the M.F.H. at home, with a selected band of members of the Meerut Tent Club, beats up the country all round the site of the Kadir, driving in the pig from the crops, from the jheels and the plantations to the area in which they will be hunted. The date for the Kadir has to be carefully chosen so that it shall not clash with the Meerut Social Week and Meerut Fair in the middle of March; if on the other hand it is left too late, the grass gets too hot and the boar lie up in the jheels, going out at night into the crops. This year the meeting was ordinarily rather late, and the further two days' delay resulted in many of the pig who had been driven in, working their way back to the jheels. Actually the supply of pig was only just equal to the demand. The first record was broken by the appearance of Lieut.-Colonel J. H. Gibbon, who had entered before he left England, never having been in India before, never having seen a wild pig and not owning a horse. We soon filled the latter want and he was greeted with great enthusiasm.

The first day's programme was a long one: eighteen heats were due to be run off in the first round. At 8.30 the line of eighty coolies with a line of thirty elephants some fifty yards behind, left Sherpur, and the first four heats rode either on or just behind the line. It should not be necessary to explain that each heat consists of three competitors with an umpire who starts them on to their pig and who decides who has won first spear. The first man to show blood on his spear pulls up, and shows his spear to the umpire, while the remaining two ride off and slay the boar.

In this competition pigsticking there are, broadly speaking, three types of heats, varying according to the country and the size and sex of the pig. First of all there is the ride after a small boar or big sow which goes off at a good pace, runs straight, and does not attempt to fight or jink. To win this heat one must have a good start and be first on the line of the pig: here it is that an old hand at the game often gets the flying start which should ensure first spear. It is an unsatisfactory form of heat, as the pig is usually

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pricked in the hind quarters, which is one of the deadly sins of real hoghunting, and only one man really gets a chance. It is only done when boar are scarce in competitions. Then there is the ride after the really small pig, who would normally not be hunted for years. This usually takes the form of a short sharp burst followed by a succession of sharp jinks, the pig turning and twisting in the grass, providing a very small target and no sport. Every member of the heat should get at least one chance of spearing first, and success is very largely a matter of luck, or shall we say of not missing one's chance. The best type of heat and the only one which is, in the opinion of many, a fair test is the hunt of a fighting boar in thick grass. To get first spear requires not only a fast, quick and bold horse, but greater hunting skill on the part of the rider. Unfortunately this year very few such heats occurred, as the grass was light and the majority of the pig small and poor fighters.

The results of the first day's heats were not very good for the Regiment. We all regretted to see such first class hoghunters as Major-General Wardrop, Paynter, Brooke and Vaughan-Hughes put out of the running, while Hugo and Kimmins of "K" Battery were exceedingly unlucky in meeting each other in a heat of two in this round. Owing to the fact that the grass was easy, there was very little grief, the only serious misadenture being an accident to Hirst's first horse which got a broken spear into its loin. The humorous element was supplied by X who took a good toss and on remounting found that the hunted boar had doubled back, shaken off the other two spears, and was ambling towards him. X met its overtures in an unfriendly spirit, striking it hard amidships and getting first spear. An even more humorous episode was afforded by two novices Y and Z, after one heat in which the boar was lost and the third member of the heat had his horse put *hors de combat.* The umpire put them on to pig after pig but neither could get a spear, and at last after a long hunt in which both horses were done, they stopped and solemnly tossed for the honour of entering the second round.

Pig were only found in pockets, heats being often two hours on the line without a ride, and owing to the scarcity, sows and small pig had to be hunted. At the end of a long day, sixteen of the heats were decided and our hopes for further successes were centred on

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Hugo, last year's finalist, who had both horses left in, Bates the 1923 winner, and Peppe who killed a large number of pig in the Agra country. It was a good round for the cavalry, Scott-Cockburn and Head of the 4th Hussars and "Squeak" Sutton of the 11th being left with two each, while Catto of the 4th had his second horse left in.

The second day opened badly and no pig at all were seen for the first two hours. Then, on the edge of thick jhow, we got into pig: Peppe, after doing all the hunting on a good pig, missed him as he jinked into the thick, and after a hard struggle in and out of small hollows and ridges lost first spear to Percy Marsh, the popular Deputy Commissioner of Meerut. Bates went down before Scott-Cockburn after a fast hunt after a small straight-running pig; Hugo got his first horse through but lost with his second. There were no outstanding or amusing incidents, no grief, and the day finished early.

The final day started with the semi-finals in grass rather thicker and on ground more broken than on the first two days. The result was that sport was infinitely better and the semi-final heats produced good hunting and undoubtedly were a better test of all-round skill than on the two previous days. In the first heat Hugo, Marsh and Scott-Cockburn were sent after a good boar in difficult country. Scott-Cockburn on Carclew, last year's winner, led, with Hugo close up. Both pecked and nearly fell, and then a sharp jink let in Marsh who rode the boar as stoutly as ever he does, but, being pre-eminently a hunter, instinctively rode rather wider than is wise in a competition, and Scott-Cockburn slipping in, cleverly got the spear. This put out the last Gunner, and it only remained to see whether Colin West, late of the Regiment and now Secretary of the Wheeler Club, could put out Scott-Cockburn's second horse and Head of the 4th Hussars in the second heat. We were not long left in doubt, for one of the flankers put up a smallish boar and the umpire brought the heat up to it. Head and West went off at full speed, the former just leading: Scott-Cockburn, getting the worst of the start, rode some four lengths behind hoping for a jink. Fortune favoured him: the pig jinked, and Scott-Cockburn swung like a flash on its track. In less than a minute he had speared and thus created the record of having both horses in the final, after winning the cup the year before.

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Of the final, there is little to say : Scott-Cockburn gave the ride on his second horse to Head : the pair were soon put on to quite a good pig and Scott-Cockburn took up the running : In this heat he gave a very fine display of hunting and the pig absolutely failed to shake him off; Head never had a chance to get in. Scott-Cockburn's horse Carclew is marvellously handy, fast, quick and very staunch; in this final heat the horse did one of the quickest turns on the pig as he jinked right back that the writer has ever seen.

So the 1925 Kadir Cup was won : a disappointing result for the Regiment which supplied 37 out of 56 entries, but there is no question but that the best man and the best horse won. Scott-Cockburn is undoubtedly the best performer after pig, whether in an ordinary meet or in competition, of the present day. The writer has seen him hunting pig in really thick jhow and he goes just as gallantly and hunts just as cleverly as he did in every round of this year's Kadir. When stationed at Muttra he ran the Tent Club there and got over a hundred first spears : when his regiment was moved to Lucknow, where pig are not, he spent all his leave at Muttra and saved that splendid country from falling into the decay which has overtaken other good stations, for which alas, we as a regiment were largely to blame. Besides being a gallant rider to pig, he plays polo and jumps in the ring with the best and is quite unassuming and unspoilt by his successes. Greatly though one longs for a Gunner to win the Kadir Cup next and every year, one cannot help wishing such a great sportsman luck in his endeavour next year to get the hat trick.

The Kadir Cup was barely won when a dust storm got up and the whole country was shrouded in a fog formed of dust particles moving at about 70 miles an hour. In this storm the Light and Heavy Weight Races for the Hoghunters' Cup were decided. The course was over some four miles of Kadir country, with three elephants out to mark the course and to form turning points. The dust storm made it quite impossible for the spectators to see anything at all and for the competitors it was a matter of luck whether they kept the course or rode off into space. Under these conditions it is not surprising that the Heavy Weight Race provided only four starters : Kimmins and Rundle of "K" and Paynter and Bates from

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The line of elephants, with syces leading horses behind.

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the 21st Field Brigade at Lahore. Paynter led the field but, losing his way, went at least half a mile too far. Kimmins fell heavily into a nullah which neither he nor his horse saw owing to the dust and was lucky not to be badly damaged. The race was won easily by Bates who managed to keep the course.

The field for the Light Weights was larger. Cherry providing two starters, with Goodman riding one of them, Wright on Paynter's second horse, Lambert of "K" with Gray of Skinner's Horse and Catto of the 4th Hussars. The storm was if anything worse and although two more elephants were taken out to help guide the starters, very few went the correct and shortest way round. Cherry following the example set by Kimmins, crashed in a sandy nullah; and though he lost the spare socks filled with sand that made up his weight, he swallowed such a lot of the river bed, that he thought it worth while remounting to follow the others. In this race again only Wright and Catto managed to keep the course, to finish in that order with Goodman making up lost ground behind them. These perilous adventures concluded the meeting and all returned to camp to find most of it blown down and everything inches deep in dust. However, by nightfall, one got sorted out and next morning camp was broken up and all went their several ways.

It only remains to give, for what they are worth, a few impressions of the Kadir Cup Meeting. First of all one would like to express the general appreciation of the excellent arrangements carried out most efficiently in spite of adversity by Kemp, the Hon. Secretary and his band of helpers. Everything was against them, all merriment was knocked out of everyone by the death of the Chief, yet in spite of difficulty and discouragement they put up a good show. One is very chary of attempting to criticise such a well-established institution as the Kadir, but in the opinion of many it has its drawbacks. The first impression that one got was that, at any rate this year, the country was too easy, and this was borne out by the almost total absence of falls. The more difficult the country, the more it is a test of hunting rather than of racing, and the more will the big boar stay in the area. Then the necessity for spearing sows and small pig this year was most unfortunate; not only it is against all the canons of the sport but it is having an adverse effect on the stock of pig in that part of the country. This

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year, and probably in other years, one had to kill these small pig in order to get through the programme, but no one will deny that it is a great pity. So few big boar were seen this year that the writer seriously suggests that they are too 'cute to stay in the area in which year by year so many boar have been slain.

Again, the very essence of the competition, the mad scurry to get the first spot of blood, is contrary to the best spirit of hog-hunting, in which team work and unselfishness are the first essentials. Every good sportsman hates to see a pig pricked behind, yet in this competition it is almost the exception to give a really disabling first spear. In the opinion of many, this practice of light spearing is reacting unfavourably on the sport, as first spears are given in many tent clubs to the first blood and not to the first crippling spear or to the man who has done most of the hunting. As a corrective to this regrettable tendency, the Muttra Cup, in which teams of three enter and win according to the proportion of pig killed to pig hunted, should most certainly be revived and the writer would appeal to the Delhi Tent Club to have a similar competition at their Christmas Meet, and to Meerut to have an annual Challenge Cup for a similar competition between teams from units stationed at Meerut.

As regards the races for the Hoghunters' Cups, there is considerable diversity of opinion as to whether they should be run. On the one hand, point-to-points have nothing to do with pig-sticking, and many people will not enter their horses, as they may be so badly damaged as to be kept out of pigsticking for the rest of the season. On the other hand they are very severe tests of a horse's staying powers and ability to stand up when going fast over four miles of pigsticking country, and of the rider's nerve, judgment and eye for country. The writer would plead that, if they are run, the course should be very carefully selected, that it should not include dry, sandy nullahs in which the first horse makes it impossible for the others to see where they are going, and that care should be taken that the elephants do not spoil the race by running away when the horses gallop up to them! Against the defects of the Kadir Cup competition, which appear to be unavoidable, one must place first of all the great camaraderie in the assembly together of so many good sportsmen and old friends, the good spirit in which all the

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losers take their disappointments, the chivalrous attitude of many of the competitors who shout out the movements of the pig as though they were hunting it as a team, and not riding against each other; and finally the determined spirit to "do one's damnedst" that is evinced by every competitor, however slender he knows his own chance to be. One believes that the balance is gain, and one looks forward to next year's Kadir hoping for better luck for the Regiment than we had this year.

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THE R.A. MESS, WOOLWICH.

The original of this drawing by Mr. John G. Platt, A.R.E, appeared in the "Morning Post" on Thursday, April 9th, 1925.

The "Morning Post" very kindly presented the R.A. Institution with a block on a reduced scale to enable the drawing to appear in the Journal. Prints of the original drawing signed by the artist, at 5/- each, can be obtained from Mr. E. H. Palmer, Circulation Manager, "Morning Post," 346 Strand, W.C.2.

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ROYAL TOURNAMENT, 1925. OFFICERS OF THE "TRAYNE OF ARTILLERIE."

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"DUNCAN" SILVER MEDAL ESSAY, 1924-25.

The Supply, Training and Organisation of Technical Specialists.

By Colonel (temp. Col. Comdt.) M. L. Wilkinson.

"ARTE ET MARTE."

THE admission of subjects, connected with the technical departments, to the "Duncan" Essay Competition is a welcome innovation and it is up to officers of those departments to seize the opportunity and voice their opinions for, undoubtedly, all is not well and there is much to be said. It is obvious that a subject of this nature does not admit of any picturesque treatment and can only appeal to a limited circle but it is free, to a great extent, from susceptibility to the more ordinary military platitudes, of the text books and service articles, and, incidentally, it is of real importance, a fact that I may, perhaps, take as my excuse for launching this essay.

I have taken leave to amend, somewhat, the sub-title suggested in the published "subject." "The formation of a special branch of artillery experts" appears too circumscribing and leaves certain important aspects uncovered. Also "experts" is an inappropriate expression. Most officers in technical employment are sufficiently educated to realise that they are unqualified for this title, which is, at times, conferred on them, in a spirit of kindly derision, by such of their regimental brothers as feel themselves quite secure from any danger of being similarly labelled. I propose to use the term "technical specialists," which is at least inoffensive, and leave "expert" to the gentlemen who tell us, from time to time, the varying amounts that Germany can pay or who testify before the coroner to the contents of the stomach.

The questions that, I suggest, call for investigation are :—Is the present supply, training, and organisation of technical specialists satisfactory? If not, why not, and what can be done about it? These, in the horrid jargon of the day, are the avenues I propose to explore in search of a formula.

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Is the supply satisfactory? Unhesitatingly no, and the present situation is of the gravest import. Officers are not coming forward in the numbers—nothing like the numbers—that will provide, after due selection, the necessary supply of trained men, of the right type, to fill our technical appointments, to say nothing of any reserve. No one, in his senses, would expect, or desire, these numbers to approach those of the candidates for the Staff College, but if one considers the Staff College at one end of the scale, with, excluding nominations, four hundred candidates from the army including eighty from the Regiment competing for fifty-seven and five vacancies respectively and, at the other end, the Advanced Class of the Artillery College with eight candidates from the army including seven from the Regiment to fill twelve vacancies, the difference stands out as wholly disproportionate. No sort of selection is possible under such conditions.

The difficulty is, by no means, a new one. On April 15th, 1868, the Council of Military Education reported to H.R.H. the Field Marshal Commanding in Chief that "The deficiency of candidates (for the Advanced Class) which was noticed in the Council's report on the First Class is still observable, although the appointment of the officers who composed that class, to situations of great trust and responsibility in the Royal Arsenal might have been expected to encourage a greater number of candidates to come forward at the recent examination. And although it may not be in the power of H.R.H. to provide employment with equal promptitude for all who successfully complete the prescribed course of study at the R.A. Institution, it would seem that the solid advantages to be derived from such a course, not less than the honorary distinction which attaches to those who have gone through it, should prove a sufficient incentive to the officers of the Royal Artillery." It is to be feared that the "honorary distinction" makes no more appeal now than it did to the mid-Victorian gunner, and that the "solid advantages" of "situations of great trust and responsibility in the Royal Arsenal" have lost much of their lure.

Coming to more modern times—matters are worse now than before the war, and requirements are greater. Why? What are the chief factors that are causing this unwillingness to enter the technical side of the Regiment? I would place them, alliteratively,

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in the following order: (1) Pay, (2) Prospects, (3) Position—an easy first and a good third.

Pay. Why does, or did, the officer take up technical work? Because of an inborn love of things scientific or mechanical, because he was at heart an engineer, mathematician, or chemist? Such is the theory, and there have actually been some to be decided by these estimable motives. Others have embarked on a technical education from the feeling that they should aspire to some further qualifications than those provided by regimental experience and gunnery courses, and that the cut-throat competition, and consequent delay, of a staff college education was prohibitive. But for the majority hard facts bring us to hard cash. To many officers the struggle to exist, under pre-war conditions of pay, became, at some time, insupportable. They contemplated, or had perpetrated, matrimony, and sought relief from a constant financial struggle at the price of work that was hard and, possibly, not altogether congenial. In pre-war days a captain who, at regimental duty, was not receiving a living wage, could increase his income by something like 75 per cent. by entering technical employment, while a major could, similarly, expect an increase up to 95 per cent. Such increases, in many cases, made all the difference, and proved a big incentive. Conditions are now changed. A living wage and recognition of matrimony are obtainable at regimental duty and the twenty to twenty-five per cent. increase, which is about the highest figure now-a-days (except for a Lieut.-Colonel, who has to pay for the privilege of working in a technical appointment) is insufficient to persuade the officer to exchange his regimental life for harder and less attractive work. The general increases and levelling up of pay are the causes and the remedies are hard to find. No one would dream of quarrelling with the long overdue grant of a living wage to the British officer, but there seems some lack of logic, or economics, in the levelling process, the outcome of causes part military, part national. Amid the aftermath of the hysteria of war a national sympathy and admiration for the men in the front line tended to regulate pay according to the danger and discomforts of the individual, and would, if pressed to an extreme, have paid the infantry private more highly than the general commanding the division. And under modern communistic principles,

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by which the totally unskilled and unfit receives a full living wage, no community can afford to pay the proportionate increase that is the just due of skill, experience, and responsibility. The facts are there, and there is a law of supply and demand. We are not getting these specialists, and, if we are to get them, we must make the pay attractive.

Prospects. In pre-war days, when the first year of the Advanced Class furnished the qualification for the Army Ordnance department, many valuable officers were lost to the technical departments by the counter-attractions of the Ordnance. And these counter-attractions were entirely prospects. A number of officers, of a good type, and up to advanced class standard, preferred the settled prospects of continuous employment and progressive advancement to the somewhat nebulous and uncertain future that lay before the p.a.c. graduate, even though the former entailed a life work that, by no stretch of imagination, could be called attractive or exciting. And the same distrust of the p.a.c. prospects remains to-day. On first qualifying from the advanced class an appointment is probably obtained. On termination of this comes "whitewash," return to regimental duty and possible migration to the ends of the earth. In time a vacancy for another appointment may occur. This may be better or worse or equal to the first appointment, it may or may not mean work for which the particular officer is suitable, or in which he is interested, and it may not be possible to bring the officer home from abroad at the moment. It all seems on the knees of the gods and the officer feels, all the time, that he is being checked in his technical progress and usefulness, he is wasting time, and he has no idea what is to happen to him next. At the moment, owing to the failure of supply to meet demand, appointments are plentiful and all can count on them, but, if we can succeed in attracting more men to this branch of the service, we shall lessen this attraction—an anomalous position. The troubles from which we are suffering are no definite organisation, no continuous progressive advancement, time wasted at "whitewash," and constant uncertainty as to the future, and for all these the remedy would seem to lie along the lines of an efficient organisation and serious consideration of the question of some form of permanent service in the technical branches.

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On this vexed question of permanent service which, I well know, has often been considered and always turned down, I confess myself converted—or perverted—by the experience of the war, which has entirely changed the situation. It is undeniable that, in a future war, of any magnitude, every officer, with technical training, will be required for technical service, and will not be permitted to serve with the fighting troops. We say, in effect, to officers who undergo a technical education, "You will not now be permitted to lead men in war, you will be required elsewhere." Wherein, then, lies the utility of the "whitewash," the periodical tour of regimental duty in peace, even assuming, what we know is frequently a false assumption, that it is responsible duty with a live unit, training and practising with up-to-date equipment? Is it really "whitewash" or eyewash? We are interrupting an officer's continuous preparation for the work he will do in war to make him, at the best, partly efficient in the duties someone else will have to perform in war, or, at the worst, just to waste his time. The two main reasons that are advanced against continuous service for the technical specialist are :—(1) That he should be first a soldier and second a technical specialist, otherwise he might just as well be out of the army altogether, and (2) that a certain number of the technically qualified must be kept unemployed to have, available, a reserve for war expansion—I fully admit the cogency of both these points but submit that, with a proper organisation, they can both be safeguarded, and I am convinced that some form of continuous service must be introduced before long.

Position. When an officer enters any of the technical branches he loses caste. It is no use blinking the fact, though I have heard it publicly and handsomely admitted that "even an X chaser may have his human moments." To the rest of the army he is a "bloke," a queer creature who, in haunts of his own, carries on some strange trade, certainly not military and of unknown utility as far as the army is concerned. The fact is that by unwritten tradition, national and military, the prestige of the individual varies directly as his connection with that noble animal the horse, and, judged by this standard, the technical specialist finishes far down the course. This is a deep seated tradition that we could not change, even if we would, but it is not universal. In some foreign

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armies there are technical services and corps that are not only esteemed, but actually hold some pride of place. It is illuminating to read in our "Memorandum on the Training of the Royal Artillery during 1924" that "In gunnery itself little improvement was noticeable, the old mistakes, which have occurred year after year, were too prevalent" . . . . "The condition of the horses and the turn out of the units were uniformly excellent throughout the year"—one need not labour the point. But apart from this there are other tangible reasons for the equivocal position held by the technical departments. They are to a great extent out of touch with the army. The army does not meet them in daily work and so cannot recognise their value and usefulness while, on the other hand, the technical specialist, immersed in his department and working much with the other services and civilians, begins to feel that he is severing his connection with the army, returning to it only on the occasions of his periodical whitewash, as a stranger, and not always a welcome stranger.

The war, unfortunately, made matters worse. The technical officer, who suffered from an educational label, was not alone in having to remain in his office while those with less experience and ability were receiving advancement and proceeding on active service, but he was probably alone in having to remain there "for the duration." He was told, at first, that his turn would come, and he possibly believed that his enforced tours of regimental duty, his promotion exams, and the rest, had implied eventual employment as a soldier. But it was soon evident that this was not to be and it may be truly said that ill-health, inefficiency, and insubordination were the only avenues of escape from a technical office at home to the army in the field. As political experiments and popular clamour developed the technical officer had to keep the flag flying for a bewildering succession of civilian chiefs, and provide the small leaven of experience and comprehension of the army's requirements that was available for his department. Small wonder that he was hampered in any efforts to move on to positions of greater responsibility or of extended usefulness in the general expansion. There was no-one to co-ordinate and supervise. Each department was a water-tight compartment with a chief looking inwards at his own particular charge, naturally anxious to keep any men who knew

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anything about the job, and often unable or unwilling to take a broad view of the needs of the nation, the army and the technical services. In the meantime the non-combatant base services abroad were recognised as serving in a theatre of war, while the technical officer, a fit, trained, experienced soldier, became "something in munitions," a term of somewhat dubious repute, and was referred to, in official documents, as one "in a semi-civilian capacity." In fact while the war was turning the civilian manhood of the nation into soldiers, it was converting experienced regular officers, with technical educations, into civilians.

These may be pin-pricks but they may, at least, partly explain the lack of enthusiasm shown by senior officers, who have undergone these experiences, in persuading the young idea to enter the technical branches. What, I submit, is required is that the regimental soldier and the technical specialist should not be divorced but should have the opportunity of working together, understanding each other, and feeling that each is a part of the army, doing a necessary part of the army's work. The technical specialist should also have a responsible and powerful chief who, free from departmental anxieties, can watch the interests of his own officers and the needs of the service at large, and can make sure that these officers are really employed to the best interests of the nation. And a technical specialist should have the opportunity of being employed, at his own job, on active service. A soldier must have a chance of serving in a theatre of war. I maintain that an efficient organisation can be devised that will achieve these ends.

On the subject of training I do not, for possibly obvious reasons, propose to enlarge, and I mention this all important part of the subject only so that the correct perspective can be preserved. Suffice to say that a well-equipped training establishment exists and if the training, now given, fails to meet requirements it can readily be made to do so.

So far organisation has been referred to only in its relation to the interests of the individual. The paramount question as to whether the technical services are organised efficiently for the discharge of their obligations to the army and the country must now be considered.

Improvement on present conditions lies in the direction of

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opening the water-tight door that now shuts off the technical officer from the army. The technical departments initiate, design, develop, perfect, and prove warlike material. They then hand this material over to the army and, broadly speaking, know it no more. Henceforward they are dependent on written reports and occasional staged visits for their knowledge of its behaviour. Though responsible for rectifying failures that may develop, they have only these reports to rely on, having had no opportunity of watching gradual progress. The difficulty of appreciating, even accepting, all these reports is manifest. And the technical specialist cannot put his inside knowledge of the new material at the disposal of the user. He is not at hand to instruct and advise as to employment, capabilities, and objects.

In war the position is worse. Modifications to material are incessant and time for perfecting and experimenting non-existent. With numbers of new troops the general standard of training is lowered, and there is no advice or help available for these partially trained men in their efforts to deal with complex equipments, subject to constant modifications, that, even in peace time, give trouble to trained and experienced troops. Actually the report of a minor defect in material reaches the technical officer, charged with its investigation, in the form of a letter signed by the commander in chief of the army in the field. Apart from the fact that this entails a delay of three months in transmission, it necessitates a goodly number of post-offices *en route*. The whole system suggests a round game played in certain circles at Christmas time, which provides a certain mild amusement for its devotees by the mangling of a message passed through a chain of intermediaries. If the telephonist, as in the classic instance, could transform the simple words of "I am going to advance, send me reinforcements" into "I am going to a dance, lend me three and fourpence," it requires little imagination to picture the ambiguity that could be introduced, by a non-technical transmitter, into, shall we say, a recital of the symptoms of some complex, but temporarily indisposed, mechanism or a diagnosis of the ailments of a recalcitrant fuze. To my own knowledge there were many occasions, during the war, on which visits by technical officers to the armies in the field quickly cleared up important questions that had remained obscure

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throughout protracted correspondence. There must have been many more cases in which the visits did not take place, and the questions remained obscure and unsatisfactory. On all occasions of such visits minor points, hardly calling for reference home through the C. in C. but still not without importance, never failed to give opportunities for mutual help and information between the regimental and technical officer.

The moral is that the technical officer is required on the spot to put the small things right, to kill the "hares" at birth, and to get quick and accurate information to the departments at home on matters that really require attention. Technical specialists should serve with the troops so that their advice and help may be always available in the use and maintenance of the various equipments, that the technical departments can be kept closely in touch with current progress, and that the same educated supervision can be kept over equipments, in the hands of the troops, as was provided for the same equipments, at early stages of their career, in the drawing offices, factories, and proving grounds.

Any organisation for the technical specialist should be placed under one responsible head who can ensure that the officers available, always too few, are employed to the best advantage of the service, and who can oppose a balanced and educated judgment to the panic re-organisations of politicians and to parochial ideas of departmental indispensability.

To meet these conditions I advocate the formation of a Technical Staff of appropriate grades—Colonels, T.S., T.S.O. 1—Lt.-Cols. and senior Majors, T.S.O. 2—Majors and senior Captains, T.S.O. 3—Captains and Subalterns—the whole under a Chief of the Technical Staff at the War Office who might, without undue optimism, be a Major-General. Establishments of suitable numbers of various grades would be assigned to the departments, committees, and directorates, and to the staffs of commands and divisions. I suggest that the first tour of appointment of a T.S.O. 3 should be in a department, for two years on probation and for four years in all. After this tour final election would have to be made, either for continuous service in the T.S. or return to regimental duty. A tour of T.S. service with a command or division would follow until, by roster, service with a department was

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again due. And so it would continue, tours of four years departmental employment alternating with periods of T.S. service with the troops. From a very rough estimate of the numbers that would be required for the departments, and that would be suitable for employment with the various formations, I think that tours of service with the troops would work out at about one and a half years. I would prefer it to be two years and more thorough examination of the matter might disclose a result nearer to this figure. It should be noted that this tour of service with the troops replaces the present "whitewash," but is of greater value both to the service and the individual. The specialist is still employed at his own job and suffers no check in his development and experience.

A p.a.c. certificate should be a necessary condition for appointment to the technical staff but on first formation, when the necessity for filling a new establishment would arise, officers, of the required ranks, possessing technical experience and recommendations, could be admitted, after undergoing a special shortened course qualifying them for a special form of certificate.

Such a system means permanent service in the T.S. and, if it is admitted that it meets the "soldier first" requirement—and I maintain that it does—it is only necessary to make provision for an adequate reserve to overcome, fully, the objections usually raised against such permanency. This necessary provision can be made, without attempting anything violently novel, by organising and training material from sources that have been tapped before and will be again, whenever there is a war.

Three classes of reserve should be instituted:—

(1) *Reserve of Officers.* Officers of technical training and experience on the retired list. A number will always be available and, for such duties as will be required of them, they could be retained on the reserve to 60 or 65 years of age. In peace time they should do periodical, say biennial, periods of attachment to the departments to which they are allotted on mobilisation to keep themselves, to some extent, abreast of modern developments, and acquainted with the personnel with whom they would have to work, and their methods. I would emphasise that each individual would be kept in touch with the branch of work that he would undertake on mobilisation.

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(2) *Territorial Reserve.* The requisite number of civilian engineers and scientists should be enrolled and given territorial commissions in the T.S. They should be given initial and refresher courses and undergo periodical periods of attachment to the departments that they join on mobilisation.

(3) *War Reserve.* To come into existence on, or soon after, the outbreak of war. Wounded and disabled officers, unlikely to be fit G.S. within a reasonable time, but able to perform sedentary work, would, if in any way suitable for technical employment, be given intensive specialised courses for posting to particular departments.

All these sources were made use of in the late war but they were unorganised and the trained material was not available for a considerable time. By organisation and training a reserve could be provided to meet the necessary war expansions of departments and allow the eventual withdrawal of such regular technical officers as would be required for the T.S. of the new formations of the army.

The duties of the T.S., especially with the troops, should be regarded as advisory—advisory in the best sense of the word, not in the sense of "*dégommé*" as sometimes understood in munition circles. The definition of the duties of his officers, to ensure that their special training and experience are used to the best advantage, will be one of the most difficult responsibilities of the Chief of the T.S. and will require his constant study. On the one hand it will be said that there can be no efficiency in a department without complete control, and responsibility for every detail, by the officer at the head of that department. On the other hand it was pathetic to see a senior artillery officer at the height of the world war, burdened with questions regarding the medical inspection and lavatory accommodation of women employees. I am afraid that I cannot get away from the platitude that each case must be settled on its merits, because that is actually what will have to be done, and it will have to be done, constantly, by one who is broad-minded, experienced, and inexorable.

In connection with this subject of the duties of the technical staff, when serving with departments, one may, perhaps be permitted to follow, for a short distance, a by-path from our main subject. It leads to the question of civilian, as compared with military, control of our technical departments, which will always

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be a difficulty to anyone who has to maintain the balance, and gives a view of the type of problem that will call for consideration. The control of our ordnance factories is now wholly civilian. This has not always been so, and the system differs from that employed in many other countries. Some experience of the system is now available and the results are worth examining. Are the results satisfactory, is the system justified? In examining these results we must free our minds from the "business man" fetish, and from the idea that the system is necessary in these days of democracy. The two great democratic nations—one military and one non-military—France and America, employ military control, and it is always dangerous to assume, without clear evidence, that we are right and the others wrong. The factories exist for war. They must be run economically, in peace, it is true, but in war cheapness and knowledge of cost will be comparatively unimportant considerations. The issue is simple. Does experience show that the system is well suited to the expansions and improvisations of war, and are the products of the factories quickly and accurately provided? These products—the important ones—are, in peace, the experimental material required to aid development and progress and, in war, the heterogeneous collection of widely differing articles of warfare that the commercial firms of the country cannot or will not undertake. The government factories will never settle down to mass production. They will ever be at the mercy of the scare or fashion of the moment and, peace time routines breaking down or proving inapplicable, much will be left to the man on the spot. If experience justifies affirmative answers to the questions set out above, the system has proved itself and its extension to other departments requires consideration, if not—well the other thing.

In settling the details of such a scheme as I have sketched out many minor points of difficulty will present themselves. Promotion in army rank, is it to be departmental or regimental? I would prefer officers to be promoted on extra-regimental lists of their own corps, retaining the uniforms of those corps. It is important to emphasize the staff, as opposed to the departmental, status both from the point of view of added prestige and to guard against the development of work of a departmental routine nature. Again—promotion examinations for technical staff officers. The technical

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officer does not fear the present examinations, foreign as they are to his ordinary work, and frequently earns distinction in them. Under the scheme I have outlined, however, it would be as suitable to make the future of the technical specialist depend on his ability to compete with an elaborate tactical scheme as to test a gas-fitter by his knowledge of Darwin's Origin of Species—and less likely to have any connection with his subsequent life. Technical staff officers should certainly be examined in some military subjects, such as organisation, military law, and essay writing, with, possibly, military geography and history. A special syllabus would be necessary.

The relations of the T.S. with the Q.M.G's services of repair and maintenance, behind the line, and especially with the O.M.E's (late I.O.M's) and I.O.O's, would require careful consideration and definition. Officers of both the last-named categories are technical specialists but are charged with departmental and routine duties, and are subject to a different branch of the army to that proposed for the technical staff. The two services can be mutually helpful, but there must be no overlapping, and, above all, no suspicion of jealousy. Perhaps it is unnecessary to mention the point as, with mutual good will, the evolution of an efficient working arrangement should present no great difficulty.

I have designedly compressed this paper, both in deference to the advice given in the published conditions for the "Duncan" Essay, and in an effort to avoid obscuring the main issues by over elaboration. It is indisputable that the supply of technical specialists is insufficient to enable the necessary posts to be filled, and hopelessly inadequate for the maintenance of a high standard of qualification by selection. Experience of war, too, has shown that efficiency calls for some measure of re-organisation. I have ventured to sketch an organisation that might prove suitable and that, if adopted, should render the technical services more attractive than they are at present, and so induce more candidates to come forward. If this scheme is thought worthy of further consideration there are, of course, many details to be examined and there are, possibly, other and better schemes. This paper, if it ever sees the light, may start the ball rolling but, when all is said and done, I am afraid the pay question is going to be the crux.

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"DUNCAN" HIGHLY COMMENDED ESSAY, 1924-25.

Anti-Aircraft Artillery. Where it now stands and how it should be used, with particular reference to Moving Warfare.

By Captain K. M. Loch, m.c., R.A.

"SIC ITUR AD ASTRA."

Introductory.

THIS year the youngest branch of the Royal Regiment enters on the second decade of its somewhat chequered career. Its arrival in the world coincided with a period of war on a hitherto unprecedented scale. Small wonder then, if it suffered in no small measure from those distempers, which are inseparable from childhood. During the war such methods and organisation as existed were of necessity based on force of circumstance. Extemporisation took the place of those well-considered lines of development, which a more leisurely period would have permitted. Seven years of peace have now allowed us to take stock of our assets and generally to set our house in order. To-day we know to a great extent what our requirements are for engaging aircraft with artillery. Many of these requirements have been met and others seem on the point of materialisation. Further, we now possess an organisation of a more or less permanent character. It may not be ideal for all natures of war, but it is self-contained and possesses a fair degree of elasticity within itself.

In writing about Anti-Aircraft Artillery, it is hard to dissociate it from other means of air defence. Aeroplanes, guns, Lewis guns, searchlights, all bear an active part in the defence, whilst concealment and protective dispositions among units in the field play an important if passive rôle towards the same end. Each branch of air defence, if organised on a sound basis, reacts on the work of the others and simplifies their task. It is not proposed to develop this truism, but rather to deal with certain aspects of the problem, which lie in the particular province of the gun. As Lewis guns now form

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an integral part of the A.A. battery, their employment will also be considered. In the main, as the title of this paper suggests, the discussion will be confined to the employment of A.A. guns in a war of movement. Needless to say, much of what will be said is conjectural, as neither the war nor the last few years have afforded much scope for putting our theories into practice. As a preliminary, a short outline will be given of the A.A. problem as it confronts the gunner with a view to pointing out how we stand to-day as regards its solution. As a corollary this will also entail a slight discursion on the habits of our adversary, the aeroplane.

The Problem of A.A. Gunnery.

The essential problems of hitting a moving object are the same, be that object an aeroplane, a tank or a running rabbit. They may be conveniently defined with respect to gunnery as follows:—

(a) The determination of the present position of the target, i.e. where it is now.

(b) The determination of the future position of the target, i.e. where it is desired to hit it.

(c) The calculation of the gunnery elements necessary to obtain a trajectory through the future position and a burst at it.

The enemy to the solution of these problems as regards A.A. gunnery is the high speed of the target. Our first postulate for success is thus rapidity in the solution of our problems. Further, an examination of the problem of the predictions, necessary for competing with aeroplanes, reveals at once certain unexpected sources of error, which are fortunately academic when dealing with other natures of gunnery. Strange terms such as secondary and complementary sources of error arise and attendant on them, formulæ bristling with x and y. These must first be solved and then simplified for the section commander in action. Hence we evolve a second postulate as regards our problem. Admitted that nature has made the solution a complex one, it is however fair to accept a complex solution as inevitable provided that the processes required to be carried out in action are simple ones. There are also, of course, the considerations of the instruments being capable of standing rough usage and of being manufactured on a large scale without undue delay.

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It is proposed now to examine the present situation as regards solving the A.A. problem, not, however, concerning ourselves with questions of manufacture.

(a) *The present position.*

The present position is determined in terms of height by height-finders with both long and short bases. Modern design tends towards instruments of the genus theodolite, accurate and easy to use. The present short base instrument is in the main very satisfactory. Its use may be said, perhaps, to require an undue amount of training, but results at practice camp tend to prove to the contrary.

(b) *The future position.*

The prediction of the future position must depend on certain assumptions. In this case the assumptions are that the target should continue on a constant course and speed during the time of flight of the shell. If we admit that the pilot is a free agent as regards his course, the future position can only be determined by black magic. The fact is, however, that in carrying out many of his duties, the pilot is far from being a free agent. Without entering into a detailed and lengthy discussion, it must be obvious that if we can punish an aeroplane which dares to fly on a constant course, we are doing far more than merely justifying our existence. Hitherto predicting instruments have not been satisfactory. To-day it would seem as if a solution has been found—a mechanical one, easy to use and with all the complicated formulæ modestly concealed in a box. In addition the factors of portability and durability appear satisfactory.

(c) *Obtaining a burst at the future position.*

High angle fire necessitated the examination of the behaviour of the time fuze in the higher altitudes. This work has now been carried out and the errors of A.A. fuzes are being reduced to some sort of relationship with those prevailing in ordinary time ranging on the flat. A satisfactory mechanical fuze would further lessen our difficulties. The exterior ballistics of high angle fire have also had their measure of attention. In short, once the future position has been determined, the gunnery elements to bombard it do not to-day present any outstanding difficulties.

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Anyone who has had the patience to read thus far may now well ask, where in point of fact does the A.A. gunner now stand? Will he bring aeroplanes down or is all this merely semi-scientific verbiage, having no relation to facts? The following table should, it is thought, give a general idea as to the present day possibilities of A.A. fire. It is based on the following premises, not one of which can be characterised as extravagant :—

(a) That the target keeps on a constant course for say twenty seconds;
(b) That the target is travelling at about 120 m.p.h.
(c) That four 3″ 20cwt. guns are being used, each firing five bursts of four rounds each (i.e. an expenditure of 80 rounds);
(d) That the accuracy in determining the future position is based on the accuracy to be expected of present-day instruments;
(e) That the radius of effect of the shell is 12 yds. (based on actual experiments);
(f) That a 100% margin is allowed for errors in laying, bad fuzes, etc. (i.e. the calculated odds are doubled).

Here then are the odds against hitting aircraft.

Height of target	*Odds against a hit during its course*
3000— 6000 feet	6 to 4
6000— 9000 ,,	3 to 1
9000—12000 ,,	5 to 1
12000—15000 ,,	8 to 1

It is hoped as a result of practice against the sleeve target that the above odds may be less next season. It should be noted that the introduction of an equipment firing a heavier shell with shorter times of flight would all react in favour of the A.A. gunner.

The Aeroplane.

The tactical employment of any defensive weapon must be based on the form of attack which it is designed to meet. It is proposed, therefore, to define the method in which we may expect aeroplanes to be employed, particularly in a war of movement. Static warfare,

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as a distinguished French general once put it, consists of "*un peu de barrage, un peu de mathématique et voilà tout.*" As such it presents little of tactical interest to the A.A. gunner.

The outstanding characteristic of the aeroplane is its mobility combined with the fact that it has introduced a new dimension into war. War, from being a one dimensional affair, of two opposing lines seeking a decision by penetration or envelopment, has now become two dimensional from its outset. It is possible to jump over the opponent's line and attack his rear services and civil population. In other words, the air represents a new and exposed flank to troops on the ground and war is fought in areas as opposed to lines.

An aeroplane can act in two main ways—directly by bombing or machine gunning and we might also include artillery observation in this category—or by reconnaissance. Whatever may be its mode of employment the main advantage it possesses over other arms is its capacity to penetrate over back areas. It is against these back areas that we may expect air activity to be directed rather than against troops in the firing line. Thus to interfere to the maximum degree with an army in the field on Z day the air effort should be made on Z - 2 day against railheads and railway movement, on Z - 1 day against supply columns, etc (i.e. the area between railhead and the front), whilst on Z day itself, the immediate reserves should be attacked.

At the same time during the advance of the armies and during the fighting itself there will be movement in the forward areas, which offer opportunities for attack from the air. Further, there will also be air activity over the forward areas in connection with reconnaissance and artillery registration. Thus, although it may be necessary to employ the bulk of the air defence units in back areas, yet provision must be made for the protection of the forward zone.

A word now as to the potentialities of aeroplanes and their general use. Except against large targets the effect of bombing from high altitudes is small. In a war of movement large targets should be exceptional if the principle of concealment and protective dispositions are observed. The processes involved in accurate bombing are sufficiently analogous to those of the A.A. gunner to rouse his

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sympathy. Machine gunning must clearly be carried out at low altitudes and short ranges. As regards reconnaissance, eye visibility, except against large and badly concealed objects, requires again low altitudes. Camera visibility is, however, a different matter and adequate photographs can be taken from great heights. As regards front areas we can assume, therefore, broadly speaking that there will be a zone of activity of machine gunning and eye reconnaissance up to 3000 feet, and a general zone of activity of all natures up to 12,000 feet or more. Above these altitudes certain specialised work may be carried out, but with comparative infrequency. Machines may fly at greater altitudes when crossing back areas or bombing large targets. It must, however, be remembered that where mobility is not of primary importance A.A. guns can be used which can fire up to any ceiling likely to be attained by aircraft.[1] As regards the areas of movement of an army in the field it is clear from the above considerations, that if we can engage aircraft satisfactorily up to 15,000 feet, we are hampering their activities to a marked degree.

The Anti-Aircraft Gun.

Before defining how we will employ A.A. guns let us first examine what are their present limitations and general capacity. Our present gun can reach 21,000 feet and can cover a radius of about three miles up to a height of 15,000 feet. It is either mounted on a lorry or on a semi-mobile platform drawn by a tractor—speed of lorry gun 8 m.p.h., of the tractor drawn gun 4 m.p.h. Both types require good surfaces to travel on and in general it may be said that the movements of A.A. guns are confined to roads or to their immediate vicinity. Modern developments in mechanical traction seem to point to a more suitable type of vehicle being evolved in the near future. This might be a wheeled or track vehicle but the ideal would appear to be a wheeled vehicle with a system of tracks which could be attached where necessary. The ideal to be aimed at is to have a tactical mobility equal to horse

[1] The American army have apparently tried A.A. guns of 120 mm. calibre. In France the St. Chamond firm have produced equipments to fire shells weighing over 30 lbs. with an M.V. of about 2950 F.S. (100 M.M. Puissant). These guns are designed to be mobile though it would seem that their mobility could hardly enable them to be used in forward areas.

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drawn vehicles across country, but with higher speeds on good surfaces.

Organisation.

The fire unit is the section of two guns. This section is organised to be completely self-supporting. Although four guns together represent probably the ideal unit as regards fire power, yet the section organisation is sound especially in moving warfare where tactical considerations assume a great importance. Further with the number of guns likely to be available it is doubtful if the area can be covered adequately using four guns together. The section has transport for personnel, instruments and 480 rounds of ammunition. Time into action—lorry guns two minutes, semi-mobile guns fifteen. Above the section comes the battery consisting of eight guns, i.e. four sections. It also contains an A.A. Lewis gun section of eight guns carried in four heavy vans. These Lewis guns are extra to the guns provided for the local protection of the artillery sections (scale 1 per section). Although these Lewis guns form part of the battery organisation, their employment points to their being brigaded or even coming under the control of the Air Defence Brigade. The Anti-Aircraft Artillery Brigade consists of three batteries. At present two batteries have their guns on lorries and one on semi-mobile platforms. The Brigade also has a signal section.

Two anti-aircraft brigades form the artillery of an Air Defence Brigade, which also contains a searchlight battalion and more signals. The Air Defence Brigade, which it is proposed to provide on a scale of one per corps, thus consists of 48 guns, 48 Lewis guns and 96 searchlights. In this paper we are, however, confining our attention mainly to the artillery; accordingly the tactical handling of the battery will be our chief consideration. In passing we should like to put forward the plea for a change in nomenclature. The existence in a single formation of an Air Defence Brigade and two A.A. artillery brigades only tends to increase the feeling among other units that air defence is an involved and mysterious affair. Why not—"An Air Defence Group" instead of Air Defence Brigade? Having defined the means at our disposal we can now examine how they should be used.

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The Tactical Handling of A.A. Artillery.

(a) *General considerations.*

We have demonstrated that in the forwarded areas we should endeavour to cope with aerial activity up to 15,000 feet. We have further shown that our present gun can engage targets at this height up to about three miles ground range from it. Anti-aircraft defence must of necessity be an area defence, though the protection of vulnerable points may modify our distribution of guns. In its simplest form, then, we should cover our area equally with gun positions. In practice, however, an equal distribution of guns over the area may be wasteful and end in being strong nowhere. Apart from vulnerable points the nature of the country is a factor to be taken into account. Open country is clearly good aeroplane country, the reverse also holds true. The general policy of anti-tank defence is to occupy positions so that tanks are, so to speak, forced into narrow waters. The same principle applies in air defence. The possibilities of successful air attack may be limited in a large measure by judicious use of ground and incidentally by weather conditions, etc. We can then concentrate our artificial defences where natural ones are lacking. Turning from the general to the particular, the tactics of A.A. artillery in the defence of fixed areas such as railheads is a simple matter. The guns are disposed once and for all to cover the vulnerable points in the area to the best advantage. In the case of a war of movement the problem of the forward area defence is, however, to provide protection over a moving area. This implies more or less frequent changes of gun positions with all the attendant difficulties of road movement and communications in areas crowded with troops. More is required than "*un peu de barrage et un peu de mathématique.*"

(b) *A.A. artillery in a war of movement.*

The provision of A.A. protection over a moving area may be required in a variety of circumstances, each presenting special features requiring a solution on their own merits. Thus a retirement may call for more guns in the front line than an advance. Special operations such as the landing or re-embarkation of a force may call for special A.A. measures Certain conditions may permit a higher degree of centralisation and control than others. In

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general, however, the principles remain the same and it is thought that these are best illustrated by a concrete example. It is proposed, therefore, to consider the case of the advance of a corps, with two divisions in front and one in reserve, railhead being situated some twenty miles in rear of the area of movement.

It is assumed that the advance is being continued at normal rates, but that enemy opposition may be met with. The advance is being made along those parallel roads, which exist in schemes, but rarely on the map. The air defence commander selects a general line dividing the forward and back area defences. He might in this case allot a whole A.A. artillery brigade to the defence of the forward area or he might only allocate two lorry gun batteries to this purpose, retaining the third battery of the brigade as part of his back area defence. In the case in point, however, we will assume one whole brigade allotted to the forward area, the second one being kept for railhead defence, etc.

The searchlights would normally be allotted to this latter area. A portion may be employed to form a lighted area for our defensive aircraft. As a rule it will be rare to find searchlights in the advanced areas, though possibly some might be used with the reserve division. Apart from the time required to establish a lighted area, in the nature of things aerial action by night against troops in the forward zones is hardly likely to have any permanent influence on the operations, provided reasonable measures are adopted as regards dispositions. Suffice it then to say for purposes of this discussion, that where lighted areas can be established and where targets are illuminated frequently, the problems of A.A. fire by night are if anything simpler than by day. If, however, targets are not illuminated, recourse may have to be made to firing to sound, a palpably inaccurate method, but which it is fair to say has in the past been more successful than it deserved. In our forward areas then, AA. guns will not normally fire by night, nor will moves of A.A. sections by night be anything but an exceptional procedure.

To revert to our scheme—the advanced brigade commander may sub-allot his command so that one battery is attached to each division. In principle, however, A.A. guns should only be temporarily allotted to divisions and they should revert to corps control at the earliest opportunity. This does not, however, relieve the

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battery commander from the responsibility of keeping in touch with the staff of the division in the area in which he is operating. The considerations which would justify the detachment of batteries to divisions, would mainly be cases when divisions were acting independently or where movements of formations might be interfered with by the enemy.

The lay-out of the defences.

At the beginning of the march, on each divisional front we might find two sections about 4500 yards apart (to allow overlap of fire), as far forward as feasible, possibly in the gap between the advanced guard and the main body, or even well up with the advanced guard. Thus on the corps front we should have four sections in the front line (two from each battery). About three miles behind these, a second line of guns would be formed. In this case the battery commander might be able to cover the area using four guns together. This must naturally depend on the size of the area to be defended. As the advance continues A.A. guns must be moved forward to conform to it. Thus if a normal rate of advance is maintained moves of sections will be necessary about every hour. The A.A. manual suggests "leapfrogging" of sections as a normal method. In practice the front sections will, as a rule, move forward, the rear sections closing up to occupy their old positions. This simplifies the not too easy job of reconnaissance for new positions.

Procedure of Units and Duties of Commanders.

We now come to the procedure of the units and the duties of the various commanders. These will be discussed under the following headings :—

(a) The section.
(b) The battery.
(c) The brigade.
(d) The staff.
(e) Signals and communications.
(f) Ammunition supply.

(a) *The section.*

The section being the fire unit is the backbone of the defence. An advance of ten miles may involve over a dozen moves of sections

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in a battery. This does not take into account local moves forced on the section by shell fire— a not inconsiderable factor in A.A. operations near the front line. The problem in each case is the move of a unit consisting of two heavy and six light lorries over roads more or less congested with other troops. As far as possible moves will be carried out on a timed programme but enemy action and other reasons may render this impossible.

The first requirement for the move of a section is, therefore, reconnaissance. As soon as a section is in action, the reconnaissance officer must reconnoitre positions ahead and the routes to them. Particularly he should endeavour to find routes not congested with other traffic. He should get in touch with other units and with sections on his flanks thus generally finding out the situation. In many cases the best method is to keep in touch with the advanced guard commander. With a little judgment moves can be carried out as a rule without undue interference with other units. The hourly halt on the march may provide an excellent opportunity for changing positions. Troops should, however, assist these moves as far as possible. A recent memorandum on training has suggested that the moves of A.A. units should be regarded similarly to the moves of the fire engine in civil life. This exactly hits off our requirements.

The officer left on the section position, apart from his duties in action, must see to his communications with the battery headquarters and also to the ammuniton supply. A pre-arranged system must be employed to let the reconnaissance officer and others know, if a sudden change of positon has been necessitated.

(b) *The Battery Commander.*

The battery commander keeps in touch with the brigade commander and the staff of the formation to which he is attached. From the brigade commander he should receive general instructions as to the proposed moves of A.A. units on his flanks. This should prevent an uneven distribution of A.A. guns in the area. From the staff he should receive information as to the operations contemplated and as to whether any points on the line of march require special protection. By this are implied ravines, road junctions, etc., where congestion is likely to occur and massed targets be presented to the attacking aeroplanes.

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On the receipt of the above information the battery commander can formulate his plan and embody it in his orders. The following headings are suggested :—

(i) An information paragraph covering the scope of the operation.

(ii) The initial lay out of the sections, stating where necessary, times when positions must be occupied. The same applies to the Lewis gun section if under the battery commander's orders. (The layout may often be determined automatically by the previous day's operations, the sections thus being already in position.)

(iii) A timed programme of subsequent moves.

(iv) Instructions to section commanders as to formations with which to get into touch. If the probable nature of enemy action can be predicted, section commanders may be given orders as to the procedure to be adopted in such circumstances.

(v) Position of battery headquarters and subsequent moves.

(vi) System of communications—procedure of units to keep battery commanders informed of change of position—what long base heightfinders are to be set up.

(vii) Method of ammunition supply—any special distribution of ammunition lorries to sections, system of supplies if necessary.

(viii) What activity reports, etc., are required and when.

(ix) Any special instructions as to vulnerable points, co-operation with R.A.F., etc., in fact any special information not covered by standing orders.

Much of the success of the employment of the A.A. artillery will depend on the soundness and detail of this plan. Apart from the section commanders, copies will be required by the brigade commander, division and neighbouring battery commanders. Once the march has started the battery commander has more or less a roving commission. In the main his duties will be as follows :—

(a) A general supervision of the moves. He should co-ordinate these so that as few guns as possible are out of action at the same time. If the timed programme breaks

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down he may have to get in touch with the sections personally and also with the neighbouring batteries via the brigade commander or possibly direct.

(b) Collection of information for the brigade commander. This implies the general situation as affecting A.A. moves, aerial activity, etc. He may also be called upon to assist the R.A.F. directly by wireless to our machines in the air.

(c) The supervision of communications and ammunition supply. These duties may be delegated to the battery captain.

(d) Keeping in touch with the formation to which he is attached.

(c) *The A.A. Bde. Commander.*

In consultation with commanders of the higher formations, he will co-ordinate the moves of the batteries. This applies specially to the moves of the rear battery, which may vary its rôle from time to time. It may sometimes merely form an addition to the general area defence or it may be employed on special duties in connection with small vulnerable points. It may also be distributed so as to protect lorry columns and road movement in the immediate back areas. It should be remembered that moves of the semi-mobile gun are considerably slower than those of the lorry gun, both as regards times of getting in and out of action and also speed on the road. The brigade commander may also be responsible for the employment of the A.A. Lewis gun sections of his batteries (see later).

Any orders issued by the brigade should be of a "directive" nature. In a war of movement any attempt to lay down positions of sections, except in general terms in order to co-ordinate the boundaries of battery areas, is to be deprecated. In the defence of vulnerable points and back areas more precise instructions may be issued.

(d) *The staff.*

A.A. units will normally deal with the "G" branch of the staff of the formation to which they are attached. The staff should thus be prepared to give A.A. commanders such information as bears on the A.A. question. This implies a general outline of

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operations with special reference to points where traffic constriction may be expected. The A.A. units should be given a free hand as regards their duties. Their organisation makes them very independent as regards administration. They should not be tied down as to the times of their moves nor should attempts be made to put them in march tables. The main assistance they require as regards moves is the goodwill of troops on the line of march.

As regards orders, all that is normally necessary is a short paragraph stating the allotment of A.A. units to the formations. Sometimes a definite number of guns and Lewis guns may be detailed in orders for the protection of certain localities. The time at which the defence will be required should be stated, as it should be remembered that in an area of movement the time during which an A.A. defile must be protected is usually of importance. Thus we might see in orders "1st A.A. battery will allot two sections of A.A. guns and its Lewis gun section to cover the passage of bridge at X from 10.00 hrs. till 14.00 hrs." or, possibly, "during the passage of 3rd Inf. Bde. Group."

(e) *Signals and communications.*

In back areas an elaborate system of communication can be established both for the collection of information and for assisting in fighting the guns. In areas of movement such a procedure is not possible. In the main all that can be accomplished is the maintenance of an intelligence system of communications by telephone and D.R.

The general requirements of a section are met as regards fighting by the establishment of long base heightfinders, as regards intelligence by communications to the battery headquarters. It may be possible for front sections to set up long base heightfinders in the initial lay out. These may be used subsequently by rear sections on moving up. Reliance will, however, have to be made chiefly on short base instruments. Communications by telephone may be possible during the advance but more often a D.R. service will have to suffice as far as forward sections are concerned. The present organisation permits of a fair D.R. service being maintained.

The use of a battery signal car is contemplated in this year's manœuvres, and from experience gained it is hoped to see how far it is possible to maintain telephonic communication.

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In general it may be said that this is not of vital importance for forward sections.

(f) *Ammunition supply.*

The present scale of gun ammunition allotted to the A.A. section is 240 rounds per gun with the section or in the battery. The next echelon of supply is No. 3 Section Corps Troops M.T. Co., and behind it railhead. The section of the Corps M.T. Co. carries 9 heavy lorry loads of ammunition. Guns in back areas will usually draw direct from railhead : so that we can say that the ammunition in the Corps M.T. will, as a rule, exist for the benefit of guns operating in the forward area, i.e. about 80 rounds per gun.

Whatever provision may be made in the ammunition echelons, there still remains the problem of supplying advanced sections. In fine weather the expenditure of ammunition by these guns is likely to be considerable.

The suggestion has been put forward to form a brigade ammunition column, either separately or by taking away some of the section ammunition lorries and pooling their resources. The fallacy here is that distances become very large, and it is doubtful whether a column under brigade control would adequately cope with the sudden requirements of distant sections. It is considered that measures should be taken within the battery itself to form the extra ammunition echelon.. The system must, however be elastic. Thus, taking two 30-cwt. ammunition lorries from each section and forming a battery pool, the requirements of each section could be met as follows.

In the initial lay out each forward section would be allowed its full quota of ammunition, i.e. four 30-cwt. lorries. When moves forward are contemplated, the forward sections should always advance with a full complement of ammunition. Full lorries would have to be sent up from the pool formed from the rear sections. The empty lorries would then proceed via the battery pool to refill from the M.T. Co. or the A.R.P. If the rear sections are to occupy the old positions of the front line section, lorries which are nearly empty might dump ammunition on the position before proceeding to refill. Here again it is hoped that manœuvres will afford valuable experience as to the working of the ammunition supply. A.A. ammunition lorries should be allowed precedence on the

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roads in the advanced area. A light lorry is not likely to interfere with the movements of other troops. The smooth working of the scheme requires foresight on the part of the officer in charge of the pool, particularly as to when ammunition can be sent forward with the least chance of blocking roads. In this matter the reconnaissance officers of the rear sections can greatly assist.

The Employment of the A.A. Lewis Guns.

A discussion of the tactical employment of A.A. artillery can hardly omit the question of the A.A. Lewis gun. Field service regulations delegate the responsibility of A.A. defence under 3000 feet to units and to small arm fire generally. This does not, however, relieve A.A. guns of the responsibility of engaging targets of this nature. In fact, contrary to generally conceived ideas such targets may be very easy ones. However as stated the A.A. Lewis gun is the main weapon concerned in such conditions. It is proposed to examine what chances of success are to be expected from such a weapon and then how it should be employed in the Air Defence Brigade.

The A.A. Lewis Gun.

As in the case of A.A. gunnery the problem of hitting a moving target consists in bringing fire to bear on the future position. The forward area A.A. sight is so constructed as to be accurate at one speed and one angle of sight. If the target is correctly followed, keeping the aeroplane on the edge of the sight with its direction of flight towards the centre, a twofold operation is being performed. This operation has its exact counterpart in game shooting, i.e. following the bird and laying in front of it to allow for its travel during the time of flight of the shot. So analagous is the problem that a sight similar to the A.A. sight has been designed for use with shot guns and the device has been found excellent in teaching game shooting, if not perhaps so suitable for work in the field.

By means of the correct use of the sight, the Lewis gun is directed along the future line of sight of the target. The errors in calculations of speed and the corrections for tangent elevation are absorbed by the cone of fire put up. The reason why the above obvious description is given, is that units do not appear to have

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any confidence in the weapon. This is mainly due to a not very suitable mounting and to difficulties in training in peace time.

As regards training, the main difficulty lies in teaching the man to swing with the target rather than in using the sight. This is a common difficulty in game shooting. Given a proper understanding of the weapon and its technical handling, the difficulty can largely be overcome by practising against clay pigeons with a shot gun substituted for the Lewis gun barrel. Where feasible, this practice can be supplemented by laying on actual machines with the camera gun. Further it is hoped that actual practice may be obtained against a sleeve target towed by an aeroplane : it is, however, submitted that the present A.A. Lewis gun practice is unsuitable to anything but the elementary stages of training, and that of all A.A. weapons the possibilities of the Lewis gun have been least appreciated. One would like to feel that a low flying attack against well trained troops should prove *"une mission de sacrifice" as* described in the French Manuals.

Tactical Employment of the A.A. Lewis Gun Sections.

As previously indicated the Lewis gun sections of the A.A. batteries will usually be brigaded and employed separately to the batteries. In a division there are some eighty Lewis guns among units allotted for A.A. defence. Without difficulty this number could be greatly increased by training a certain number of the battalion Lewis guns for A.A. work when not required for land duties. Further, the troops in the forward areas are much less vulnerable to air attack by virtue of their normal fighting dispositions. The area, however, which lacks A.A. protection as regards Lewis guns is the general area back to railhead, along which supply columns, etc. are moving. It is in this area, therefore, that these sections should be used. In practice part may form a more or less permanent defence of dumps, etc., but part should be allotted to the routes along which movement is taking place. Hence the sections must be mobile. As regards actual employment it is considered that in dangerous areas gun positions should be about 500 yards apart, if possible four guns used close together. In the defence of bridges and A.A. defiles guns may be massed up to any number. In the protection of troops and

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columns the principle is to piquet the routes in a somewhat analogous manner to piqueting the heights in mountain warfare. As the advance continues it may be necessary to move the piquets. Here the staff can greatly assist by giving a general time programme of moves of columns, etc. Thus one can imagine a section in the course of a day :—

(a) Protecting an S.R.P. whilst distribution is going on;

(b) Seeing a lorry column over an open stretch of road;

(c) Concentrated with other sections covering a bridge.

Once more it is hoped this year's manœuvres will afford valuable experience in work which has so far received but little attention. It is, however, fair to suggest that an A.A. Lewis gun section is an excellent command for a subaltern giving, as it does, plenty of scope for initiative. Finally it cannot be too often pointed out how much can be done to help the protection of units against low flying machines by suitable provision on the part of the units themselves. It is not perhaps too much to say that in many cases, if units suffer from low-flying attacks from a small number of machines, they have only themselves to blame.

A.A. Guns Employed against Tanks.

By virtue of an all round traverse and a rapid rate of fire, and of the general training of detachments against fast moving targets, A.A. guns are in many ways well suited for engaging tanks. Sections in the forward areas will fire against tanks just as other natures of guns. There is also a possibility of rushing up guns from the back areas to cope with a tank break-through. Although A.A. guns should not normally be sited or employed for other purposes than engaging aircraft, yet the critical situation arising out of a tank attack on a large scale may outweigh all other considerations. An experiment carried out some years ago under very unfavourable conditions gave quite promising results. The present requirements are, roughly, reduced charge ammunition and suitable regradation of the range dials.

The system of fire should not differ materially from that employed with other natures of guns in anti-tank defence. It is suggested, however, that rapid ranging should be carried out with one gun, after which bursts of fire similar to those employed against

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aircraft should be used. Instead of using reference points targets should be pointed out by means of the traversing arc, a method to which the detachments are accustomed. It enables large switches to be carried out quickly and accurately. It is thought that one officer should conduct the shoot, whilst the other watches for new targets, calculating the necessary switches from the height fuze indicator scale, which has been previously set to read the same as the traversing arc on the guns. Any subaltern capable of taking an eye shoot against an aeroplane should find little difficulty in engaging a comparatively slow moving target, such as a tank. The alterations in deflections due to "jinking," etc., on the part of the target are small in comparison. The main difficulty seems to lie in the rather exposed position of the detachments and that preliminary registration may not be feasible. In addition, it should be noted that the present heightfinder is not graduated to read ranges under 2000 yards. Practice in tank shoots, however, is required if officers and detachments are to get the best value out of the equipment.

CO-OPERATION OF OTHER FORMS OF ARTILLERY IN A.A. DEFENCE.

Particularly abroad attention is being given to the possibility of employing other forms of artillery for air defence at times when it is not required in its normal capacity. If we consider an operation such as the passage of the German 1st and 2nd armies through Aix La Chapelle in 1914, it is clear that in the future massing of troops on such a scale renders strong anti-aircraft measures imperative. More especially in the concentration period and subsequent advance many occasions are likely to occur when a reinforcement is required to the existing A.A. units.

This reinforcement may be provided in three ways:—

(a) By utilising field equipments as they stand;

(b) By devising a general utility gun for all purposes;

(c) By providing special platforms on which to mount field equipments.

(a) The chief use to which field equipments can be put as they stand is to provide geographic barrages, i.e., barrages fixed as regards area covered but varying in height. These may prove invaluable in the defence of small vulnerable points. Very little training will be required to enable the necessary control to be established.

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(b) Future tendencies may well be towards a gun of general utility, i.e., capable of engaging both aircraft and ground targets. It seems doubtful whether such an equipment will prove satisfactory. Compromise in gun design generally produces unsatisfactory results. Good results, however, may be obtained against low-flying targets. As these are likely to be frequent, it would seem worth while training a large number of officers in the somewhat difficult art of eye shooting. In peace the A.A. miniature range gives excellent practice as regards methods and estimation of deflection.

(c) For accurate A.A. shooting special training and instruments are necessary. Field units can hardly be expected to undertake such work in addition to their already multifarous duties. Provided the equipment can be fired up to an elevation of say 60°, without detriment to the recoil arrangements, there seems a good case for being prepared to mount them on specially adapted platforms. The elements of fire could be calculated at a central control situated near the guns and given to them in terms of bearing, quadrant elevation and fuze range. Little practice would then be necessary for the gun detachments.

Indirect fire against aircraft has been the subject of investigation for some time, and quite a number of instruments have been designed for the purpose. The main difficulty has been the transmission of the calculated elements to the guns, rather than the calculations themselves, or the work of the gun detachments. It would seem that the production of a self-contained indirect fire outfit mounted on a lorry would present little difficulty. It is suggested that a number of such lorries with trained detachments should form part of the Air Defence organisation. These could be detailed when required to field artillery units. As regards platforms for the guns, the French St. Chamond firm have produced what appears to be a satisfactory solution. This particular platform is designed for the 75$^{m/m}$ field gun. It consists in the main of a turn table with a device for anchoring the ordinary mounting to it. The gun has merely to be manhandled on to it. Two such platforms can be carried on a single trailer. In no sense is it suggested that batteries should be cumbered up with such impedimenta, but if a

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number of these platforms were available, it is thought that they would provide a valuable asset in air defence in the preliminary stages of a campaign.

CONCLUSIONS.

(a) Although few soldiers are prepared to admit that the air will be the decisive factor in wars of the future, yet it is clear that air activity will make itself felt from the outset of a campaign. It would thus seem folly to neglect any means of air defence which are available. It is submitted that A.A. artillery has now reached a stage of development which justifies close attention being given to it. It should not be judged on its immature efforts in the last war..

(b) As regards the tactical handling of A.A. artillery, the defence of the back areas renders centralisation possible and even desirable. The centralisation of intelligence is essential under these conditions as other means of A.A. defence are immediately concerned. In addition centralised control may assist in the fighting of the guns themselves. On the other hand the methods of employing A.A. units in areas of movement make decentralisation a necessity. Owing to the widespread action of units, tactically speaking, we must therefore regard the section as the equivalent of a battery, the battery as a brigade. The functions of the A.A. brigade commander then approximate to that of the C.R.A. of a division.

(c) Owing to the amalgamation of the regiment, in the course of his career an officer will in the future normally serve periods in each branch of the artillery. For those who may be faced with joining an A.A. unit, let it be said that our procedure presents no mystery whilst our tactics give at least as much scope for initiative in the junior ranks as other branches—and after all aeroplane shooting is an amusing pastime.

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"DUNCAN" HIGHLY COMMENDED ESSAY, 1925-6.

The Effect of Tactics on the Organisation and Command of Artillery.

By Bt. Lt.-Col. H. W. Wynter, d.s.o., R.H.A.

"C'EST AVEC L'ARTILLERIE QU'ON FAIT LA GUERRE."
(Napoleon.)

1. It is said of Marshal Lefèbvre, husband of the famous "Madame Sans-Gêne" who at one time washed the great Napoleon's clothes, that before at action he sent for his Artillery Commander (or was it "adviser"?) and said to him. *"Je n'entends rien de votre affaire, mais fichez-moi un trou et j'y passerai."* The Duke of Dantzig's not very elegant remark expresses the mutual confidence which should inspire the relationship between the Commander of a force and the chief of his artillery. Moreover the latter half of it also describes tersely but effectively the part that artillery is called upon to play in battle, and with it we may compare the more refined and formal language of Section 15 (1) of Field Service Regulations, Volume II.

2. Command is inseparable from Organisation, and the object of organisation is tactical and administrative efficiency. Tactics are of the first importance and administration serves their ends, but in these days of mechanical aids, of vast ammunition expenditure and of heavy casualties, it is necessary to guard against any tendency to overlook the vital importance of efficient administration. No organisation is effective if the strain of prolonged fighting breaks the links between artillery units and those organisations in rear which supply them with ammunition and reinforcements, and enable them to carry out repairs to material. The organisation must be elastic and flexible. If it is too rigid it will inevitably break down at some critical moment.

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The Principles of War.

3. The tactical handling of artillery whether in offence or defence is based upon certain of the principles of war, and its organisation should be such as will enable those principles to be put into practice. They are surprise, concentration, economy of force, mobility, co-operation. The subject under consideration is best discussed in relation to these five axioms, and a short historical survey illustrated by references to artillery tactics will be a suitable introduction to it.

An Historical Survey.

4. The scientific use of artillery in field warfare began with Frederick the Great who abolished the system of "battalion guns" in the Prussian Army. It was further developed by Napoleon, himself be it remembered an artilleryman. Before the Seven Years' War guns were used at haphazard among the infantry, and were not organised in batteries except for siege purposes. They were less mobile than the infantry and there was no thought of any of the principles mentioned above except co-operation.

5. Napoleon was perhaps the first soldier to realize the full value of Artillery in War. "*Les grandes batailles,*" he says, "*se gagnent avec l'artillerie.*" The attack was prepared by literally "making a hole," to quote Lefèbvre's expression, in the enemy's lines, by means of a concentration of artillery fire so heavy that the defending troops were destroyed or demoralized. There was then nothing for the cavalry or infantry to do but to go through the gap. "When once the combat has grown hot" wrote Napoleon, "the general who has the skill to unite an imposing mass of artillery suddenly and without his adversary's knowledge in front of some point of the hostile position may be sure of success." The action of the artillery reserve under General de Sénarmont at Friedland, and of the artillery of the Guard under Drouot against Von Wrede's left at Hanau furnish classic examples of the Emperor's methods. His tactics embody all the five principles of war that have been described above. Concentration, surprise and co-operation are clearly implied in what has already been said. His invariable organisation of an artillery reserve exemplifies the economy of force and the value of mobility. On the 2nd June, 1813, only five

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months before the Battle of Hanau, he wrote as follows; *"C'est l'artillerie de ma garde qui décide la plupart des batailles, parce que l'ayant toujours sous la main, je puis la porter partout où il est nécessaire."*

Mutatis mutandis, Napoleon's organisation and tactics were repeated on an immense scale in the late war.

6. It must be remembered, however, that the application of principles varies with the power and precision of guns and small arms. In Napoleon's time these were very much limited. In the first place the range of guns was so short that concentrated fire demanded concentrated batteries. For the same reason if it was desired to concentrate guns the required number of batteries had to be kept in hand from the beginning. Once committed to action they could not have been withdrawn in time to grasp a fleeting opportunity for decisive attack. Moreover, unless the gun layer could see his target his chances of hitting it were of the slightest. Most important of all, the infantry musket was not effective beyond 100 yards or so, and attacking columns could, therefore, advance with comparative immunity until they were within that distance of the defenders. It is impossible to exaggerate the effect on tactics, particularly in regard to time and space, of the vastly increased defensive power of infantry firearms.

7. Napoleon's Tactics as put into effect by himself seldom if ever failed, though Waterloo is a notable exception. His Marshals were less successful, particularly in Spain, and for two reasons. In the first place the opportunity for decisive action occurred but seldom, and its duration was not long. It had to be seized at once or it was lost for ever. To seize it was, in the words of the French "pre-war" regulations *"une œuvre de coup d'œil et de caractère qui ne peut être soumise à aucune règle précise."* Few of the Marshals were equal to the occasion.

In the second place the Napoleonic tactics depended for success on the ability to destroy or demoralize the defence. Against the archaic methods of Austrian or Prussian troops this was not difficult, but when faced with the more scientific defence of Wellington's highly trained infantry, these sledge-hammer blows had but little effect. The English had an awkward habit of occupying positions on the reverse slopes of hills out of sight of the French gun layers,

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and to a great extent defiladed from their fire. Consequently the bombardment was ineffective and the defence remained unshaken. In spite of failures, however, the prestige of the French Artillery has remained to this day. Perhaps this is not to be wondered at seeing that a French artillery officer attained to the iron crown of Charlemagne.

8. During the 19th century the development of artillery organisation and tactics did not keep pace with the improvement in guns and small arms. It fell behind in the race, and had not caught up when the great conflagration broke out in 1914. The principles of war are immutable but the constant improvement of the weapons of war, which makes time and space variable factors, necessitates modification of the tactical methods by means of which the principles are put into practice. The teaching of Napoleon was followed in theory but it was applied without intelligence to the new tactical problems that resulted from the introduction of rifled weapons, smokeless powder and machine guns. An example of this is afforded by the Prussian Army in the campaign of Sadowa. By that time Napoleon's "artillery reserve" had become the "reserve artillery," a distinction with a great difference. What had been in Napoleon's hands a highly mobile concentration of guns used with lightning-like speed to force a decision, had degenerated into a formal and rigid organisation of whose inaction and lack of initiative Prince Kraft complains bitterly when writing of the Sadowa operations. As a result of their experiences in 1866 the Germans, determined that in future offensive operations every available gun should be used from the earliest possible moment, went to the opposite extreme and decentralized the command of artillery to Corps and Divisions. Much ammunition was in consequence wasted during the Franco German war in objectless bombardments such as took place at St. Privat before the attack of the Prussian Guard, to which the artillery gave no support whatever. Nevertheless after 1870 command was still further decentralized, and all field artillery became Divisional Troops. This example was followed by us, but not by the French who retained one regiment (48 guns) as corps artillery. On account of this decentralization the power to concentrate fire was to a great extent lost, with the result of waste of energy and lack of co-operation.

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9. The Napoleonic method of bombarding the enemy before an attack was religiously followed. But as is often the case with religion, it had degenerated into a formality, and its devotees had forgotten that unless a bombardment has the effect of destroying or demoralizing the enemy it is mere waste of ammunition and of no assistance to the other arms, whose task it is to capture the position. Its object had thus been lost sight of, in fact at one period it was not at all clear whether the enemy's guns or his infantry were to be the target. The current expression "artillery duel" rather points to the former. The question was indeed temporarily settled when artillery took up covered positions, and having no aircraft co-operation were unable to fire at each other. Moreover, it was not realized that against entrenched infantry a preliminary bombardment by field artillery eliminates the advantage of surprise and has little or no effect; and further that against the long range rifle fire of an unshaken defence the attacking infantry is powerless, unless the enemy be kept under accurate covering fire.

There was eventually a limited recognition of the "increased strength of the local defensive," which is referred to in our Field Service Regulations of 1909, but it was at the same time laid down that attacking infantry could not advance within six hundred yards of a position that was under the fire of its own guns, for fear of shells falling short! There could be no better proof of the fact that no one really understood how much the strength of the defence had increased, nor how the altered factors of time and space had increased the difficulty of putting into practice the principle of co-operation. It is true that in "Modern Artillery in the Field," published in 1910, Colonel Bethell in dealing with this question says "it is better to keep up the fire until our men are within a hundred yards or less. Even if a few shrapnel bullets take effect on our troops, they will suffer much less than if left unsupported." But his was "a voice crying in the wilderness." It was only by bitter experience in the Great War that we learnt the true facts of the case.

In regard to co-operation there was more than a tendency, at any rate until 1909 or 1910, to regard the artillery and infantry combats as quite independent of each other, and for mutual support to be purely fortuitous. The French regulations of 1903 are full

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of this heresy. From 1910 onwards the teaching was on sounder lines, but the writers of text-books were far from realizing the nature of the approaching struggle which they all foresaw. But chiefly did they fail to grasp the defensive power of modern fire arms in the hands of resolute infantry. Thus, in spite of lip-service, were the great principles lost to sight, though it is true that one of them—mobility—became a fetish. In the race between the development of artillery tactics and organisation and the improvement in weapons, the latter was, in 1914, still well ahead.

10. Before leaving the 19th century a reference must be made to the American Civil War in order to exemplify the failure to appreciate the modification in tactics due to the improvement in guns and small arms. We have Henderson's authority for saying that the tactics and organisation of both sides during the later stages of the conflict were ahead of those of the Germans in 1870, and this is as true of the artillery as of the other arms. To quote Mr. Jorrocks's classic expression in regard to cab horses, the Americans learnt a lot of "good avoidance" in the course of making innumerable mistakes. Of mistakes made by artillery a typical example is provided by an episode that occurred on the 3rd July, 1863, the third day of that most interesting of battles, Gettysburg, a battle which Henderson describes as "a detailed object lesson in artillery tactics such as is seldom met with."

The last of a series of badly co-ordinated and unsuccessful Confederate attacks was made at about 1.45 p.m. on the 3rd July by Pickett's Division of Longstreet's (1st) Corps, against the Federal position on the Cemetery Ridge. To prepare and support this attack Colonel E. P. Alexander, commanding the 1st Corps Artillery, placed some ninety guns of the Corps and Divisional Artillery in line at an average range of about 1500 yards from the enemy's position. There were also about eighty-four guns of the 2nd Corps (Ewell) and the 3rd Corps (A. P. Hill) that were in a position to help, but their fire was not co-ordinated with that of the 1st Corps, and was squandered on objectives of no tactical importance. Alexander was ordered by Longstreet (who was most unwilling to let Pickett attack, and after the latter had started tried to recall him) to open his bombardment on the enemy's infantry and guns at 1 p.m. He was also told to give Pickett the signal to move, "if the artillery

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has the desired effect of driving the enemy off, or has other effect such as to warrant us in making the attack." Alexander, dismayed at the terrible responsibility thus put on his shoulders, pointed out how hard it would be to judge what effect his guns had had, especially on the infantry whom they could not see, and that a bombardment of more than an hour would exhaust his ammunition. For 25 minutes the enemy's guns replied vigorously, but fire then ceased and guns were seen to be withdrawn under cover. This, however, was not the result of Alexander's bombardment but of an order by General Hunt, who commanded the Federal artillery. "I withdrew the batteries," he wrote afterwards, "to replenish ammunition, and prepare for the assault that *I knew must follow.*"

Meanwhile Alexander had sent to Pickett to say that unless he started at once ammunition would run out. The attack did not start till about 1.45, and ammunition had by that time got so short that there was enough only for about one gun in four, and these guns moved forward in close support of the attack. How ineffective the Confederate fire had been was soon made tragically clear by the repulse of Pickett's division after heroic efforts with very heavy losses caused by the enemy's guns and rifle fire.

The errors made by the Confederates' artillery may be summarized as follows :—In the first place Alexander had "advertised" the intention to attack by a prolonged and ineffective bombardment, an error which, to quote the Federal Artilleryman Hunt, "was the besetting sin of some of our commanders." There was therefore, no possibility of surprise. The failure of ammunition was due to loss of touch with the ammunition columns, and not altogether Alexander's fault. The Confederate fire had, as we have seen, but little moral or physical effect, and when Pickett's attack started co-operation failed from lack of ammunition. The map shows that Alexander's guns could have continued to shell the point of attack without being masked, while the Confederate infantry advanced across the low ground between their positions and the Cemetery Ridge. That Alexander, a highly trained soldier, was fully aware of the disadvantage of a preliminary cannonade and of the necessity for maintaining fire on the defenders' position during the actual progress of the attack and until the last possible moment, is proved by the fact that on the second day of the battle during the

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successful attack on the salient then held by the Federal left flank, his guns did not open fire until the infantry actually began the attack, and continued until they had almost reached their objective. One imagines that on the 3rd of July he had not a free hand.

The failure of Pickett's atttack shows most clearly the effect of improved weapons on the time and space elements in tactics. If the Federals had been armed with smooth bore guns and muskets, Pickett's troqps might well have succeeded in rushing the position for the fighting would have taken place at very short ranges. But times had changed. As was previously the case in the Peninsular War, the bombardment at Gettysburg failed because of the superior tactics of the defending infantry, quite apart from the fact that in this case the defending artillery also was very ably handled. They were sheltered by trenches and stone walls, so that the Confederate gun layers could not see them, and in consequence their fire became scattered. Moreover, the guns of Ewell's and Hill's Corps acted independently of Longstreet's owing to lack of control by the higher Artillery Command.[1] The mere assembly of 150 guns has no intrinsic merit. Unless their fire is co-ordinated and is effective against the objective of the attack, concentration becomes a mere formality, economy of force is impossible, and co-operation is completely lacking.

On the Federal side General Hunt, the chief of the Federal Artillery, exercised most effective command both on the 2nd and 3rd of July. All available guns were brought to bear on Pickett's division and played a prominent part in repelling the attack. It should be remembered, however, that until 1915 or even later, few people realised how little destructive effect shell fire has against troops even lightly entrenched, and how persistently covering fire must be maintained in order to neutralise rifles and machine guns, and to enable the infantry to advance within assaulting distance. Our regulations as late as 1914 (See para. 9 above) would have left Pickett with six hundred yards to cross without any artillery support. Too much blame cannot, therefore, be attached to the Confederate gunners for making the mistake fifty years earlier.

[1] General W. N. Pendleton commanded the whole of Lee's artillery but seems to have exercised no control at Gettysburg.

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The Great War.

11. From the date of the declaration of war in 1914 the British Army began to grow and the artillery grew with it. Artillery organisation was modified and improved to suit the conditions of the moment. On the Western Front order began to emerge from something like chaos towards the end of 1915, by which time experience had cleared away any doubt that may have remained as to the important part guns of all natures were destined to play.

12. The history of the development of artillery tactics and organisation during the period 1914-1918, reveals a gradual but on the whole successful solution of the problem of applying the five principles which have been so often quoted, to the circumstances of warfare waged with weapons that constantly increased in mechanical power and precision. Quite early it was recognised that an immense superiority in artillery was needed to ensure the success of an attack on highly organised defences; and the concentration of great masses of guns for the attacks of 1916, 1917 and 1918 were a repetition on a vast scale of Napoleon's concentrations at Hanau or Friedland. The problem of co-operation was solved, in course of time, by the "creeping barrage," the development of counter-battery action and the improvement of communications. Surprise was at length attained at Cambrai by means of survey and calibration, and with the aid of tanks which made it possible to dispense with the preliminary wire cutting. In spite of the effective use of artillery reserves, economy of force was never fully realised either in attack or defence. Too many guns and too much ammunition were often used, especially during the intervals between the limited attacks of 1917 in the Ypres area, and there was in consequence a waste of man-power which was hard to replace.

The ideal of mobility was not lost sight of, but trench trained artillery could not be expected to be fully mobile, and the advance in 1918 proved that they were not.

13. The command and organisation of the ever increasing quantity of artillery was another great problem. As the scope of operations became wider, the preparation of artillery support became more elaborate and its execution more complicated. Hence the need for increasing the number of commanders and staff officers. At the beginning of the war all field artillery and such medium

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batteries as existed, were divisional troops. By the end of 1914, however, the weak force of medium and heavy artillery that had been created became, from force of circumstances, "G.H.Q. Troops," and remained so till the end. In spite of opposition which never quite ceased, the Higher Command soon formed the correct opinion that in modern war on a large scale the bulk of the artillery must be organised as a fluid strategic reserve in the hands of the Commander-in-Chief, or at least of the Commander of a Group of Armies, though for operations they must necessarily be placed under the tactical control of lower formations. The organisation of the medium and heavy artillery that has just been described, satisfied these conditions, and as a result of experience in 1916 it was eventually applied to part of the field artillery also. This was a most important innovation which has affected the whole principle of artillery organisation, both in peace and war.

14. Our experiences during the Somme offensive in 1916 showed that the infantry units became exhausted earlier and had to be relieved more often than the batteries that supported them (though that is no excuse for the opinion apparently held by some commanders that artillery never required any rest !). Consequently the divisional artillery was frequently separated for months at a time from its division, and administrative confusion ensued to the detriment of the batteries concerned. Accordingly at the beginning of 1917 one brigade was withdrawn from each divisional artillery, leaving the division with forty-eight guns instead of seventy-two. As is well known the surplus brigades were called "Army Field Artillery," and became a reserve in the hands of G.H.Q., capable of being moved from one point to another without dislocating the organisation of any formation. From a strategical and tactical point of view this scheme was a complete success. The army brigades were available to reinforce any part of the line in attack or defence, and forty-eight field guns were quite enough to cover a division holding a normal defensive front.

On the other hand, the army brigades had more than their share of heavy fighting, and having no permanent administrative staff at their backs, were in a somewhat "orphaned" condition, though less so than if they had been dependent on a divisional staff perhaps fifty miles away. The medium and heavy brigades which

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were in an analogous position, were better off because they were not moved so often, and the Corps Heavy Artillery Headquarters which was available to look after them, was provided with a Staff Captain who had no other duties. The war ended before a satisfactory solution to this difficulty could be found.

COMMAND AND ORGANISATION IN THE FUTURE.

15. The problems of the future require definition and limitation. In the first place, what type of warfare is to be contemplated? It would seem best to consider our subject in the light of the existing conditions of war, allowing of course for improvements during the next few years in such matters as aircraft, wireless communication, tanks and mechanical traction. It is not necessary to look further than F.S.R. Volume II (1924) which lays down that "infantry is the arm which in the end wins battles. To enable it to do so the co-operation of the other arms is essential; separate and independent action by the latter cannot defeat the enemy" (Section 13 (1)).

It is assumed that the enemy is civilized and trained, and has equipment on much the same scale as ourselves; further, that the fighting is as "mobile" as the size of the respective forces allows; and that the division, the smallest individual formation containing different arms, has twelve battalions organised in three brigades. Any alteration in the strength or composition of the division would introduce many new considerations. The armament of field batteries is taken as six guns, unless otherwise stated, and when referring to field artillery the expression "guns" includes 4·5″ howitzers.

It is not intended to deal with attack and defence separately, and if illustrations of offensive tactics predominate, it is because the principal problems occur in that connection. The attacking side having the initiative controls the factors of time and space, and the defenders must conform. Hence command in defence is of necessity decentralized from the moment the first shot is fired, and organisation must be flexible enough to make decentralization easy.

STRATEGIC ORGANISATION.

16. Artillery organisation is of two kinds, strategic and tactical. Strategic organisation, which is fundamental and organic in character, enables the Higher Command to concentrate guns for

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action in any locality where a successful attack on our own part, or on that of the enemy will have a far reaching strategic effect. Tactical organisation, which should be flexible and may vary with the circumstances of the case, has for its object the efficient command of artillery in battle. In discussing the late war it was pointed out that in order to facilitate the strategic concentration of artillery the whole of the medium and heavy artillery and eventually one third of the field artillery also, were organised as "G.H.Q. Troops," a modern parallel to the "Artillery Reserve" of Napoleon. This fundamental organisation is now implicitly recognised in our War Establishments, but it will be useful to point out the merits and demerits of possible alternatives.

17. It was suggested towards the end of the war, as a further development of the "fluid reserve" theory that divisional artillery should be abolished altogether. It was argued that there was no more need of artillery than of tanks or cavalry as an integral part of the division. This proposal was ruled out for reasons that were largely based on sentiment, a sentiment whose sincerity some cynics have doubted ! It was decided that there must be some field artillery as a permanent organism within the division, but that the amount should be reduced to the lowest possible limits. This amount may be defined as the smallest number of guns required to support the infantry in minor offensive or defensive operations on an otherwise quiescent front, and was fixed at forty-eight (two brigades, each of four six-gun batteries). It should be remembered that at the period in question (1917) divisions on the Western front had still their full complement of thirteen battalions, including pioneers. The strength of divisional field artillery still remains at this figure, though with the present four-gun battery organisation there are three brigades instead of two. The addition of twelve pack howitzers to each division, and the provision of a proportion of army field artillery brigades brings the relative strength of guns and infantry to much the same ratio as in 1914. There is reason to hope that the six-gun battery may eventually be restored.

18. The other alternative organisations are as follows :—

(a) To increase the divisional artillery to its original strength of 72 guns with or without the 12 pack guns, and to include a brigade of medium artillery.

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(b) To leave the division with 48, or including the pack howitzers, 60 guns, and to introduce corps or army artillery composed of field, medium and heavy brigades.

It will be noticed that these proposals are opposed to the principle of the fluid reserve which was developed during the Great War.

19. The first alternative has most advocates. Presumably they hold the view that in the approach march, and in the preliminary fighting that will take place during deployment, the division will require all its three field artillery brigades, one of which will probably have formed part of the advanced guard. This is perhaps an arguable case, but the test of artillery organisation is its suitability for the support of a decisive attack. No one is likely to maintain that with the support of only three field artillery brigades, a division even in an encounter battle, could carry out more than a local operation unless the opposition were of the weakest. In a decisive attack some reinforcement of the field artillery would always be necessary. Moreover, the undeniable and universally admitted administrative difficulties which have been already discussed in connection with the Great War, would certainly recur. It may be contended that with small forces and open warfare they would be more easily overcome. The answer to this is that it is undesirable to have one organisation for a big army and another for a small one. At what stage does the transition from small to great take place? And, bearing in mind that the test of artillery organisation is its suitability for the support of a decisive attack, is it certain that the conditions of a small war and a great war differ very much in regard to the local strength of a defensive position, which the artillery has to overcome?

20. The best way to illustrate this argument is to build up a tactical situation based upon a hypothetical campaign, in which the odds are if anything in favour of the attack. Let it be assumed that this campaign takes place in an Eastern theatre of war, against a well-armed semi-oriental enemy, trained and partially staffed by European officers. We will suppose that our force consists of seven divisions with the usual proportion of cavalry and other army troops, and that each division has three field artillery brigades (72 guns) and 12 pack howitzers; but that there is no army field

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artillery. Let us also suppose that this force has just deployed from parallel columns of route on a front of five divisions, and is everywhere in touch with an equal or perhaps slightly superior force. An opportunity occurs for a decisive stroke, and it is determined to make a frontal attack with two of the central divisions. We have now to consider what degree of support by field artillery is desirable.

21. Assuming that the enemy stood his ground, an interval of as much as forty hours might elapse before the assault could be launched. During this interval, or even in less time, the defences of even a "semi-oriental" enemy might at least reach the state of "semi-organisation" referred to in Section 67 (1) of Field Service Regulations (Vol. II, 1924). To quote the book, "Infantry cannot advance against even semi-organised resistance unless that resistance is kept under subjection by fire power." Now without any wish to under-estimate its assistance, covering fire from machine guns will have little effect against a defensive system such as is recommended in Field Service Regulations, and can only be regarded as subsidiary. There is, therefore, little doubt but that the whole of the front of attack and localities on its flanks also,would have to be engaged by field artillery strengthened by such machine guns as might be available. This conclusion is supported by Field Service Regulations which state that in the encounter attack the strength of 18 pr. guns and 4·5 inch howitzers "will have an important bearing on the length of frontage on which the main attack can be made, but the amount of ammunition will limit the intensity of the support that can be given" (Vol. II, Section 68 (3) (vi)). It would perhaps be truer if the last phrase were altered to read "will limit the depth to which support can be given."

The danger of an encounter attack on a "semi-organised position" lies in the perilous but unavoidable ignorance that must exist in regard to the enemy's dispositions. On the subject of the deliberate attack on a fully organised position, the Field Service Regulations say that its two main characteristics are "the increased strength and depth of the enemy's defences, and the detailed knowledge the attackers will possess of the enemy's dispositions and organisation" (Section 77 (2)), and to these one might well add "the superiority of the attackers' artillery and the provision of a supply

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of ammunition, over and above that which is carried in the normal echelons." If this statement and those already quoted be considered together, one cannot but think that given the aid of tanks the risks incurred in a deliberate attack are at worst no greater than in the encounter battle. In both cases the artillery support must take the form of a barrage. The area covered will be greater in the deliberate attack because more medium and heavy guns will be present, and the barrage will be carried to a greater depth, because there is more ammunition, and because the enemy will be organised in greater depth; but for as long as it lasts the barrage which covers the assault in the encounter battle must be as intense as in a deliberate attack.

22. The disastrous events of the 9th May, 1915, when the German line was attacked near Festubert and the Rue du Bois, are indelibly stamped on the memory of the writer who was a battery commander at the time, and saw what happened. It is no exaggeration to say that the two left battalions of the Meerut division were brought to a standstill in "No-Man's-Land" by enfilade machine gun fire from somewhere near the southern edge of the Bois du Biez. It is true that our artillery bombardment had been so ineffective that when the attack started the enemy showed breast high over the parapet of his front line, firing vigorously. But it was the enfilade fire that stopped the attack. Although the front had been under observation for weeks, no one knew of those machine guns, which indeed may have taken up their position only the night before. Might not this happen again in attacking a reasonably intelligent enemy who had had a few hours in which to select concealed positions for his machine guns, if the attack were made with inadequate artillery support?

23. The length of the front of attack in the encounter battle is undoubtedly dependent on the number of guns that can be concentrated to support the infantry. The supporting guns must be numerous, and for as long as the available ammunition allows their fire must be really intense. It is true that many a shell will fall on unoccupied ground, but who can say what ground is or is not held by the enemy? and when one or two enfilading machine guns can destroy a battalion is it worth while to stint guns or ammunition?

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24. In the hypothetical case that is under consideration it would hardly be safe to attack with weaker support than one field piece to 25 yards (i.e. one 18 pr. to 33 yards). If there are no tanks artillery support should be stronger, and a preliminary bombardment to destroy wire may be necessary.

We have therefore to consider, on a basis of one field gun to 25 yards, how many guns can be collected to cover the decisive attack, and whence they are to come, and then to deduce the greatest possible extent of the front of attack.

There would be available :—

(a) Six divisional artillery brigades from the two attacking divisions (144 guns).

(b) Three divisional artillery brigades from one of the reserve divisions, which would probably be used to exploit a success, and would be rejoined by its guns when passing through (72 guns).

(c) One brigade from each of the four remaining divisions (96 guns). It would be unsound with open flanks to take from the second reserve division more than one brigade of artillery.

This gives a total of 13 brigades, that is to say 312 guns. The divisions on either flank of the attack would be able to provide guns to extend the flanks of the bombardment. Pack artillery has been ignored in view of the fact that their use in a bombardment does not appear to be contemplated as normal in Field Service Regulations (Vol. II, Section 72 (8)). 312 guns would cover 7800 yards in the proportion of one gun to 25 yards. This front could be attacked with comparative ease by eight battalions, that is to say two divisions each on a two brigade front with two leading battalions in each brigade.

25. It will be seen that there are in all seven reinforcing brigades detached from five different divisions scattered over an area perhaps 15 miles square; and that with the exception of the artillery of the reserve division all these brigades, with sections of the D.A.C's and Divisional trains, must be concentrated by means of flank marches across the lines of communication.

The writer maintains that with the more flexible system by

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which one third of the field artillery is organised in army brigades the same operations could be carried out far more quickly, and simply; and speed and simplicity are of the essence of successful tactics. As the two attacking divisions would only have two divisional artillery brigades each, nine reinforcing brigades would be necessary. These would be made up by the divisional artillery of one reserve division and the seven army brigades. The army brigades centrally placed during the strategic deployment and approach march would move forward instead of laterally into position, a far more simple process. Moreover the provision of supplies and ammunition being from rear to front, would be much easier.

When a "fluid reserve" of field artillery exists it is easy to reinforce a division in any part of the field by attaching to it an army brigade The reverse process, that is to say the detachment of an artillery unit from the division of which it is an organic part, entails disintegration and is unsatisfactory to all concerned.

26. As already stated, there are many who advocate the addition of a medium brigade to the divisional artillery. This idea arose at the end of the war, and was due to the fact that during the later stages of the final advance in the autumn of 1918 one medium brigade was almost invariably placed at the disposal of the divisional commander. In parallel circumstances this will undoubtedly happen again. But the circumstances were peculiar. Most of the divisions were further reinforced by one or more army field artillery brigades. The enemy was retreating and his resistance was weakening, the rapidity of the advance made control by the higher formations increasingly difficult owing to lack of communication, and the absence of organised defence made it often possible to attack with only a limited degree of artillery support.

As in the case of army brigades, it will be best to test this suggestion by its adaptability to the exigencies of a decisive attack against more or less organised resistance, and with reference to such of the five principles which govern the tactical handling of artillery, as are applicable to the case. In order to obtain the maximum support for the attack it will be necessary to concentrate as much medium artillery as possible. If the medium brigades were divisional troops and distributed over a wide front their concentra-

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tion would present the same difficulties with regard to movement and supply as in the case of reinforcing field artillery brigades. From a tactical point of view it is doubtful whether in the class of warfare that we have in view, so wide a dispersion of medium artillery would be justifiable. It would encumber the line of march of divisions, and as long as no serious resistance was offered by the enemy, it would have no particular duties. As soon as opposition precluded a further advance it would be necessary to carry out an organised attack for which purpose artillery would have to be concentrated on a limited portion of the front.

Moreover, the permanent inclusion of medium artillery in the cadre of divisions conflicts with the principle of economy of force. The range of the 60 pr. and the 6″ howitzer enables them to cover the front of more than one division unless divisional fronts are unusually long, and when offensive operations are in progress this is not often the case. The chord of a 60 degree arc of fire with a 60 pr. gun at its extreme range would be 15000 yards, with a 6″ howitzer 10000 yards—far more than the average front of a division. It is important to be able to use the power of these weapons to the full, especially in regard to enfilade fire. In the hands of a divisional commander their employment is apt to be "parochial," and there were instances of such parochialism in the autumn of 1918. The claims of counter-battery action must also be remembered. It is true that during the early stages of the "encounter battle" such counter battery work as is possible must be carried out under divisional arrangements, but after even a short delay the Corps would and should resume control. To make his work effective the corps artillery commander must be able to dispose of all the available medium batteries and to co-ordinate their action, so as to meet the rival claims of bombardment and counter battery work in accordance with their relative importance, which will vary from hour to hour.

27. Little need be said on the subject of the other alternative organisations. A permanent corps artillery would have most of the weak points due to overloading the division with artillery, though in the case of a small force they would be less marked. On the other hand, for reasons already given, it is wrong to have one organisation for a large army and another for a small one. When operations were in progress some of the corps artillery

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would inevitably be detached to reinforce other corps and administration would suffer. In our army, too, there is no fixed strength for a corps, nor is it desirable that there should be. Analogous objections apply to the organisation of army artillery. Except in war on a great scale G.H.Q. and Army H.Q. would be synonymous. Moreover, in a great war army artillery possesses a weakness that is also inherent in the "G.H.Q. Reserve" system. For tactical purposes army artillery would have to be placed under a corps or division, while its administration would remain in the hands of the army. Theoretically troops should be trained, administered and handled in battle by the same formation. For this reason and this alone it is admitted that the corps artillery organisation is the best, provided that corps were fixed formations. The army is certainly too large and the division perhaps too small to put this ideal into practice. The G.H.Q. reserve however possesses strategic advantages which compensate for drawbacks that may exist, and these advantages are absent from other organisations.

Tactical organisation and command.

28. Tactical command in modern war is the province of the lower formations, that is to say of the corps and the division. The strategic organisation of artillery which has just been discussed has for its object the effective distribution of artillery for offensive or defensive operations. Every force, whatever its size, must of course have a senior artillery officer with a staff of his own, at its Headquarters, but if it is larger than a corps, in the accepted sense of the term, the functions of this officer tend to become more and more advisory and administrative in character. He is too far back to exercise tactical command. The M.G.R.A. at Army H.Q. on the Western front was designated "General Officer Commanding Royal Artillery" but his command was exercised in regard to the distribution of artillery and other matters connected with the preparatory stages of operations, in regard to training, and in administrative questions. He did not attempt to exercise tactical control when a battle was in progress. This must always be the case in any force of more than one corps. The M.G.R.A. at G.H.Q. was purely an adviser though in every question affecting the administration, organisation, training, supply and distribution

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of artillery he was given a free hand, within the limits of General Staff requirements.

29. It is tactical command that must now be considered. As already stated the problems of the offensive present the greatest difficulties, and the test of both command and organisation is their efficiency in the decisive attack. Both, however, must be ordered with due regard to the necessity for effective administration. It has been pointed out that a decisive attack cannot as a rule be successful unless the divisions taking part in it are supported by a great quantity of field artillery, and that a considerable number of medium, and perhaps heavy guns must also be concentrated on the front of the corps to which the divisions belong. Provision has to be made for the tactical command and administration of this mass of artillery.

30. In the hypothetical case that has already been taken as an example the total quantity of field artillery employed to cover the attack of two divisions amounted to 13 brigades, to which must be added the two divisional brigades of pack artillery, making a total of 15 units. Each C.R.A. would have at least seven under his command. If the present system of four gun batteries continues these totals will be increased by half.

31. The artillery staff of a division is not large enough to issue detailed orders to, and otherwise control the operations of so many units. Moreover, in the encounter battle it will often happen that in addition to his normal duties the C.R.A. may also have temporarily to undertake the organisation of such counter battery action as may be possible, and this may entail the addition to his command of at least one medium brigade. He will also have to deal with questions affecting the Air Force, the Survey Company, and the organisation of ammunition supply. It is clear, therefore, that even assuming that his staff be reinforced by the addition of a corps staff officer for counter battery work, the C.R.A's hands will be very full. It is essential that there should be some means of decentralizing the command so as to limit the number of subordinates to whom orders have to be issued, to make the orders less detailed in character, and to simplify communications.

32. In analogous cases on the Western front resort was had to the system of sub-grouping. In "open warfare," however, this

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would be a very unsatifsactory solution. It involves taking a brigade commander with his adjutant and signal sub-section away from his brigade to command a group of two or three brigades. This obviously entails a complete dislocation of brigade organisation, and it is not clear how the necessary signal and other personnel for a temporary brigade staff is to be found.

33. A simpler method is to group brigades in pairs, to send each pair only one set of orders defining the combined task of both brigades, and to leave the Lieutenant-Colonels in question to divide it between them. There are several disadvantages in this expedient. in the first place, the two brigade H.Q's must be very close together which, for tactical reasons such as co-operation with infantry, the positions of batteries, and the tasks the latter are to carry out,might be highly inconvenient. Moreover there is the inevitable risk of friction due to the absence of a definite chain of command.

34. The third and best alternative is the provision of additional links in the chain, which of course means additional commanders and staffs. In view, however of the conditions of open warfare which are complicated by the increasing part played by aircraft and tanks, and demand extended reconnaissance, quick decisions on a great many points and the prompt issue of orders, both tactical and administrative, it is difficult to see how the divisional artillery staff on its present scale can perform its numerous duties in case of a decisive attack. With four-gun batteries, as we have already seen, the situation would be still further complicated.

35. The provision of additional links is of course a difficult matter to justify, because it is clearly undesirable to increase the number of commanders and staffs unless it can be shown not only that they are necessary in certain circumstances, but also that their time will be fully occupied.

In the German and French armies before the war the necessary links did exist. In the former they were supplied by the regimental commander, and in the latter by the lieutenant-colonels, who were seconds-in-command of the artillery regiments, and by the regimental commander of the corps field artillery. It would be possible, however, to combine the provision of invaluable assistance to the C.R.A. with the better administration of army field artillery brigades, provided this organisation which now exists and on account of its flexibility seems the best, is not abandoned.

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36. It is suggested that on mobilization the army brigades should, for the duration of the war, be grouped in "regiments" (or better "battalions") of two brigades. If there were an odd number of brigades one group of three might be temporarily formed. These "battalions" would be commanded by a senior lieutenant-colonel or full colonel, with an adjutant and an assistant adjutant. As a division which had to carry out a decisive attack would require reinforcing by at least two additional field artillery brigades, and usually by four, it would not often be necessary to break up a "battalion" and seldom for longer than the duration of a battle. In any case the disadvantage of having occasionally to do so would be more than counter-balanced by the tactical advantages of additional senior officers and staffs to help the C.R.A. in the command of a large concentration of guns, and by the fact that the proposed battalion staff would greatly simplify the administrative difficulties which are an undeniable handicap to the army brigade organisation. It will be well to return once more to the concrete example that has already been used; and assuming that one of the two divisions which is to attack is supported by six field brigades and one pack brigade, to consider the organisation of command for the early stages of the attack. The six brigades would include two battalions (four brigades) of "Army Field Artillery." They could be divided into two groups each of three brigades. The groups would be commanded by the "Army battalion" commanders and each group would cover one of the two leading infantry brigades. The pack artillery would remain under the command of their own lieutenant-colonel. Thus the C.R.A. would issue orders of a comparatively simple kind to three subordinates only; and he would be in a position to take command also of one or two medium brigades, in case of necessity, and as previously pointed out such a necessity might well arise in certain stages of the encounter battle.

37. The command of medium artillery presents fewer difficulties, so long as it is borne in mind that the principle of economy of force demands a high degree of centralized control in order to obtain full value from the long range of modern guns (F.S.R., Volume II, Section 72 (5)). Unless the corps artillery commander retains control of the medium artillery he cannot concentrate his fire on the decisive point, that is to say, the most important target

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at the moment from a tactical point of view. Command can easily be decentralized for a definite task and for a definite time, as for instance counter battery work in the early stages of an encounter battle, and again in the operations following a successful attack when lack of communication will prevent the corps from retaining effective control. Centralized command is especially necessary when counter-battery work is under corps control, for it is often necessary to change the tasks of batteries from bombardment to counter battery work or vice versa. At the same time the objectives which are to be shelled in immediate support of the infantry attack, must be selected in consultation with the divisional commander concerned, and should, when possible, be engaged by a definite medium artillery unit "affiliated" to the division for the purpose, but not necessarily under the orders of the divisional commander.

38. To ensure co-operation between infantry and artillery their respective commanders must be in the closest touch. Thus alone can gun fire be concentrated without delay, and with due regard to economy of ammunition, against the decisive point. In the first phase of an offensive battle centralized artillery command is the best means to this end, but during the later stages of the attack mutual support requires that command should be decentralized. In the encounter battle the enemy's position will have no great depth, and if penetration is effected subsequent operations will take the character of separate operations on a greater or less scale against centres of resistance. Artillery must advance, but in no greater strength than is necessary, for ammunition supply may become difficult. While fighting of this character continues a medium brigade should, as a rule, be placed under the orders of each divisional commander, while field artillery brigades and medium batteries will often be placed under infantry brigadiers. If a division is "leapfrogged" it should be supported by an adequate force of artillery, previously told off for the purpose. These guns would take part in the initial stages of the battle, but should be in positions from which they can move easily and quickly, when the division goes through.

CONCLUSION.

39. The principles of war do not change but their application must vary in accordance with the improvement in weapons.

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A war cannot be won except by offensive strategy, and offensive strategy implies offensive tactics and the winning of battles. It is the infantry who win battles but their attacks will not be successful unless the objective be subjected to effective covering fire maintained until they are within a very short distance of it. This covering fire is mainly the duty of the artillery. Artillery fire must surprise the enemy. Surprise can only be attained by careful preparation and by full use of survey and calibration. Fire must be concentrated against the decisive point and concentration can only be attained if organisation is flexible enough to enable reinforcing artillery to be brought into position quickly and without friction.

It is essential that guns and ammunition should be economised and this economy demands centralization of command, as far as is compatible with the exigencies of co-operation. Artillery must co-operate closely with the other arms. The efficiency of artillery co-operation in the attack is directly proportionate to the rapidity with which fire can be brought to bear on the point of resistance, and to the accuracy with which it can be maintained until the last possible minute before the assault is delivered. Co-operation cannot be close unless communication is rapid and uninterrupted.

In the encounter battle success depends upon rapidity of action, and mobility is essential if artillery is to play an effective part.

The organisation and command of artillery must be such as to ensure that its action is in accordance with the principles of war. The theory which governed Napoleon's method of employing artillery cannot be improved upon, but it is incumbent upon all artillerymen to remember that the application of this theory to fire tactics is always dependent on the weapons of war, and to see to it that modifications in practice keep pace with mechanical improvements due to the developments of modern science.

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THE PACK GUN IN MOUNTAIN WARFARE.

By Colonel H. Rowan-Robinson, C.M.G., D.S.O.

IN the Quarterly Summary of Artillery Information—No. 11—1924 appeared a short article decrying the value of a pack gun as opposed to that of a pack howitzer in mountain warfare. Its general intention appeared to be to refute certain arguments said to be urged by the advocates of the pack gun; but, since the arguments as voiced by the latter vary considerably from those suggested in the article, it is proposed herein to state both sides in an impartial form.

Two years ago it was decided that the 2·75″ gun was not up to modern requirements, and the question arose whether to replace it in the Indian pack artillery brigade by a modern gun or by the 3·7″ howitzer. The matter was very thoroughly ventilated before a decision was reached. Firstly the opinions of all commanders of pack artillery brigades and those of all infantry brigades and higher formations serving on the frontier were taken. These revealed a strong balance in favour of the retention of the gun. Then the C.G.S. in India assembled a committee of officers of the widest experience of mountain warfare, and including an expert in ballistics, to consider the subject. This committee reported unanimously and very strongly in favour of the immediate provision of a modern gun. The Commander-in-Chief supported this recommendation, but it does not appear to have found favourable acceptance at home. The home authorities are naturally anxious that pack artillery brigades, both in India and at home, shall be equipped alike—and the latter have no gun battery in their organisation. Further, they believe it possible to produce shrapnel for the 3·7″ howitzer which will enable the howitzer to fulfil all frontier requirements special to the gun. Discussion has also ranged round the possibility or otherwise of designing a gun of satisfactory ballistics within the limits of weight imposed by the maximum number of mules admitted. Accordingly no action of any importance was, apparently, taken until the publication of the article under review, to a consideration of which we may now proceed.

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The opening sentence proclaims an idea to be widely held that the howitzer, for reasons of trajectory, is more dangerous to the infantryman in mountain warfare than the gun, and a picture is drawn ridiculing that idea. It may be stated at once that no such idea prevails or has prevailed. Another sentence, supported also by a diagram, belabours the belief that the gun is much more accurate than the howitzer. That belief has never been held. Then mention is made of the distrust with which the howitzer is viewed. Actually, far from viewing it with distrust, all frontier soldiers, gunners and infantry alike, are enthusiastic in its praise. They consider it has placed the pack artillery on a far higher plane of mechanical efficiency than ever before. Only they do not consider it fulfils *all* the requirements of a mountain artillery weapon in frontier warfare. They are supported in this not only by the fact of the existing organisation but also by the fact that when a small column is formed a mixed battery of guns and howitzers is often sent off with it.

The rest of the article deals mainly with the question of whether infantry can be afforded equally good support with the howitzer as with the gun, provided a satisfactory shrapnel can be designed for the former; and the conclusion is reached that it can be done. We have no quarrel here either with the statement of the case or with the conclusion drawn. In fact, the points in favour of the howitzer might have been more strongly urged.

Having stated the general case and the case as outlined in the article under review, it may be well to summarize the "fors and agins" as they appear to the soldier in India.

(1) It is advisable that organisation and equipment in India shall follow the lines adopted in England as closely as possible.

(2) Great simplification in the supply of ammunition and gun equipment will result from the exclusion of the gun.

(3) On the other hand,

(a) Pack artillery as a branch was evolved in India. In India it has a permanent home. The rôle of pack artillery in England differs greatly from that of its confrère in India, and its permanence is less sure. In these circumstances is it right that England should furnish the model?

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(b) In India the pack artillery is often the only artillery of the force. In such a case is it right for the force to be without guns? Does any gunner ever contemplate our first four divisions fighting on the continent equipped with howitzers only?

(4) It is held by experts at home, as already stated, that a gun which would fulfil satisfactorily the given requirements (roughly, m.v. 1450, range 7500^{x}, weight of projectile 13 lbs.) could not be designed within the limits of weight. Is it not a pessimistic view that, after all the experience of the war in gun-building, nothing much better than the obsolete 2·75″ can be produced? Have differential recoil and all modern improvements been tried out? It should be remembered that rapidity of assembly is no longer so important now that the Vickers machine-gun plays so great a rôle, and that this allows the designer a little more latitude than of yore.

(5) In considering the relative efficiency of 3·7″ and 2·75″ shrapnel, the following points should be borne in mind:—

(a) A 3·7″ shrapnel equal in value to the 2·75″ shrapnel will only have 57% of the efficiency of the latter relatively to mule carriage. To be worth its weight on the back of a mule the howitzer shrapnel should be as effective as a gun shrapnel of equal weight.

(b) Ranging rounds may be counted as ineffective. Those of the howitzer weigh the heavier. In mountain warfare the number of targets and, consequently, the number of ranging rounds is relatively large.

(c) Enfilade fire is of particular value in supporting an advance, and from this action H.E. is wholly excluded owing to its wide radial effect. The use of shrapnel is, therefore, essential, and the weapon which has the deeper zone of effect is naturally to be preferred for this purpose. The advantage of the gun over the howitzer in this respect is the more obvious at the relatively larger ranges ordained by enfilade fire.

(d) The fuse will only arm with the fifth charge of the howitzer. Now this charge imposes so severe a strain on the carriage

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as to have necessitated the issue of an order forbidding its use in peace. If the howitzer shrapnel is introduced and that order holds, no practice with this equipment can take place in peace. The order will not hold, however, and the introduction of 3·7″ shrapnel will therefore entail the expenditure of at least 30% of that ammunition both in peace and war and a corresponding increase in the strains imposed. It is therefore certain that a large wastage in carriages will ensue, no strengthening being possible as the loads into which the carriage is divided are already at the high limit. The constant use of the fifth charge will also add not inconsiderably to the wear of the bore.

(6) The shrapnel of the 3·7″ howitzer should not, however, be judged in relation to that of the 2·75″ gun, but in relation to that of a modern gun.

(7) With the introduction of wireless telephony, which is on the verge of becoming a practical proposition for artillery, a range of 6000≙ as the maximum range of artillery with any force will be regarded as wholly inadequate.

This summary of arguments would appear to point to the following conclusion :—

The 3·7″ howitzer is a first class weapon, fully up to the work for which it was designed, but does not as at present equipped fulfil all the artillery requirements of service on the Indian frontier. If, however, it can be provided with a shrapnel, which can be fired without undue strain on the carriage and is equal in effect, weight for weight, to that of a really modern gun, then, and *then only*, the gun, in spite of its other advantages, should be discarded and the howitzer alone be used in pack artillery whether at home or abroad. If, however, a really satisfactory shrapnel cannot be designed for the 3·7″ howitzer, the gun battery should be retained in the Indian pack artillery brigade, and the 2·75″ should be replaced as soon as possible by a modern gun.

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THE EVOLUTION OF ARTILLERY IN THE GREAT WAR.

IV.—THE EVOLUTION OF ARTILLERY ORGANISATION AND COMMAND.

By Major (Bt. Lieut.-Colonel) A. F. Brooke, d.s.o., *p.s.c.*, R.A.

THE study of the evolution of artillery organisation and command during the Great War is apt to lead us into a maze of minor details which obscure the outstanding events and provide only a blurred picture of the important strides made during the period under consideration

We must consequently endeavour to sift the grain from the chaff by rejecting all minor changes of a transitory nature, and focus our attention on those alterations which have fundamentally affected the artillery as a whole.

The subject will be simplified if we treat the field artillery and heavy artillery separately, and subsequently examine the question of command with a final general survey of the French and German organisations.

1. The Evolution of Field Artillery Organisation.

The outstanding events in the evolution of field artillery organisation may be summarised as under:—

(a) The standardisation rendered necessary by the variety of organisations which came into force during the early months of the war.
(b) The adoption of four gun batteries for the New Army with the final reversion to six gun batteries.
(c) The formation of composite brigades of 18 pr. and 4·5″ how. batteries.
(d) The creation of the Army Brigade, R.F.A.
(e) The abolition of the Brigade Ammunition Column.

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(a) *Standardisation.*

We have already seen in a previous article that the organisation of the six Expeditionary Force Divisions could not be maintained, as far as artillery was concerned, in the subsequent divisions sent to the front. The 7th and 8th Divisions and the Indian Divisions introduced two separate divisional artillery organisations, whilst the territorial divisions and New Army divisions brought with them further differences. As a result we had no less than five field artillery establishments with divisions by the end of 1914. It was evident that standardisation must be sought by a process of re-organisation.

Between October and December, 1914, the first steps were taken, and consisted of a gradual replacement of the 15 prs. and 5″ hows. of the Territorial Army by 18 prs. and 4·5″ hows., and by providing 4·5″ how. batteries to those divisions which were deficient of this nature of equipment. These steps only partially overcame our troubles as it still left the Territorial divisions on the four gun establishment, as opposed to the six gun batteries of the regular division, whilst the new army batteries were also being raised on a four gun establishment. It was evidently essential that a uniform battery establishment should be decided on, but the difficulty lay in deciding on the procedure to adopt. It was inadvisable to reduce the establishment of the batteries of the regular divisions, already inadequately provided in artillery. But on the other hand the more obvious procedure of raising the territorial and new army batteries to a six gun establishment was strongly opposed on the grounds that the untrained officers, N.C.O's and men of the new army would be unable to efficiently handle six gun batteries in action.

During the whole of 1915, and the greater part of 1916, minor changes were brought about whilst larger changes were freely discussed. No useful purpose would be served by a minute examination of these changes; it is sufficient to recognise the fact that the multitude of existing establishments complicated the administration of divisional artilleries, rendered reliefs most intricate and mitigated against their tactical efficiency. It is to be hoped that the lessons which we learnt in overcoming the difficulties incumbent on lack of standardisation may not be forgotten in the future, and that they may strengthen us in resisting the temptation to adopt any

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differences in the organisation of the territorial army from that of the regular army.

By June, 1916, the absolute necessity for economy in the higher ranks of R.F.A. officers, forced the adjutant general to express the opinion that it was desirable to revert to a six gun establishment throughout the British armies in France. Owing to the operations in progress at that time the Commander-in-Chief decided that he would not yet consider any departure from the four gun establishment. But, by August, 1916, the situation as regards R.F.A. personnel had grown so critical that his hand was forced, a proportion of the divisional artilleries, namely on defensive fronts, was raised to six gun batteries, whilst the remainder followed suit shortly afterwards. It is of special interest to note that the organisation of the battery was settled by administrative necessity in opposition to the prevailing opinion as regards existing tactical requirements.

Concurrently with the above changes the 4·5″ how. brigade had been undergoing a process of evolution. At an early date in the war it was realised that the field howitzer brigade organisation was ill adapted to requirements, and it became a common practice to form composite brigades of three batteries of 18 prs. and one battery of 4·5″ hows. This improvised system gradually became recognised and was officially adopted as the standard establishment in May, 1916.

(b) *Introduction of Army Brigade, R.F.A.*

The prolonged fighting on the Somme in 1916 subjected our half-baked re-organisation to further stresses and strains and brought additional requirements to our notice. It became evident at once that the period of exhaustion of divisional artilleries did not coincide with that of the infantry of their divisions, whilst the actual requirements in field artillery support could not be met by the artillery of the division, necessitating reinforcements from divisions out of the line. As a result three distinct evils were produced :—

(i) Divisional artilleries were gradually being divorced from their divisions, with the consequent loss of "liaison" so essential for close co-operation.

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(ii) A large proportion of the available field artillery was continually on the move, from one part of the battle front to another.

(iii) Divisional artilleries were at times retained in the line, long after the withdrawal of the infantry, and until they were all but exhausted.

When it is realised that during these operations an average of some 80 batteries of R.F.A. were continually on the move, it will be seen that the existing organisation was responsible for a considerable loss of gun power. It was felt that a new organisation was required whereby a reserve of field artillery could be formed, independent from the divisional organisation, and available to reinforce offensive fronts as required. To meet these requirements the army brigade organisation was introduced in November of 1916, and resulted in the following changes.

(i) The divisional artillery was reduced to two artillery brigades, each consisting of three six-gun 18 pr. batteries and one six-gun 4·5″ how. battery.

(ii) From units rendered surplus by the above new organisation a certain number of army brigades, R.F.A., were to be formed similar in every respect to the divisional artillery brigades.

The fact must be recognised that this new organisation was in many respects similar to that existing in the French army at the outbreak of the war.

New 18 pr. batteries were still at this period under process of formation at home, and were to be embodied in army brigades, R.F.A., as they became available. The ultimate aim being to raise a total number of such artillery brigades equivalent to the number of divisional artilleries in France. This figure was never reached, by the time of the armistice the number of army brigades, R.F.A., had risen to 51, whilst the number of divisional artilleries stood at 61. A glance at Appendix E. will show that even at the conclusion of hostilities we had been unable to complete the process of standardisation of artillery brigades.

(c) *Abolition of Brigade Ammunition Columns.*

Concurrently with the above changes the ammunition columns of the division were undergoing a process of re-organisation.

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The corps was gradually replacing the division as the tactical unit, whilst restricted fighting fronts, covered by a greater density of troops, and provided with a limited number of roads, rendered the retention of two ammunition echelons within the division no longer necessary or desirable. In addition to the above consideration the efficiency of railway and mechanical transport as a medium for the conveyance of ammunition had exceeded our pre-war expectation and consequently rendered it possible to reconsider the distribution of our "reservoirs" of artillery ammunition in the field. Finally the necessity for economising horses and personnel rendered a change essential.

As a result by May, 1916, the decision was arrived at to abolish the brigade ammunition columns and to re-organise the divisional ammunition column into two echelons:

"A" Echelon, consisting of three sections, to accompany its division closely at all times, each section being similar in capacity and nature of vehicles to the old brigade ammunition columns.

"B" Echelon, consisting of one section, comprising almost entirely G.S. wagons, intended to follow the division only when circumstances permitted, and detachable under corps control when necessary.

The number of rounds of 18 pr. carried with the new echelons amounted to 103 rds. 18 pr. and 114 rds. 4·5″ how. as opposed to a previous 202 rds. 18 pr. and 92 rds. 4·5″ how., but a net saving of 10 officers, 255 other ranks, and 310 horses per division was effected, whilst an increase was made in the stock of 18 pr. ammunition maintained on the L. of C. to compensate the reduction of 99 rounds entailed by the new organisation.

(d) *Trench Mortars.*

Our survey of the evolution of field artillery organisation would be incomplete without a word of reference to trench mortars.

In 1915 the revival of the mortar as a modern weapon of war led to a considerable discussion as to whether it should form part of the infantry or artillery organisation. By the end of the year Solomon's good example had once more been followed and the unwelcome child was divided between the two mothers. It was

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decided that light batteries should be manned by infantry personnel, and the medium batteries by artillery personnel.

By 1916 the medium batteries had become an integral part of the divisional artilleries, and a divisional trench mortar officer was subsequently introduced to assist in the control of these batteries.

During 1916 one heavy trench mortar battery was added to the divisional trench mortar organisation, but by 1917 these batteries were withdrawn from divisions, reduced to one per corps, and placed under corps control. Finally in 1918 the decision to abolish this nature of equipment resulted in the abolition of these batteries.

The medium batteries were also subjected to a further change and reduced to a basis of two six-mortar batteries per division, admitting of a more generous establishment.

The resumption of a less static nature of operations in the latter stages of the war called for a more mobile trench mortar organisation, by the time of the armistice a scheme for the provision of the necessary organisation had been completed, but had not yet been put into effect.

2. The Evolution of Heavy Artillery Organisation.

The evolution of the heavy artillery organisation was influenced by the fact that in the early days of the war the paucity of this nature of equipment rendered the economy of its fire power of predominant importance, and it was only in the latter stages that sufficient heavy artillery became available to render possible an organisation calculated to meet the requirements of modern war. It should, therefore, be realised that the first steps in the evolution of heavy artillery organisation were mainly directed towards endeavouring to make best use of the few available batteries, and that these resources were such as to preclude any possibility of arriving at an ideal solution.

By the beginning of 1915 it was realised that the distribution of the few available 60 pr. batteries on the divisional establishment did not lead to an economy of force. These batteries were consequently withdrawn from divisions, and, together with the 6″ how. siege batteries, were formed into "Army Artillery." The object

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being to provide army commanders with artillery wherewith to reinforce divisions as required.

On the arrival in France of the heavy tractor drawn howitzers these were organised into a "Heavy Artillery Reserve," destined to form a reserve in the hands of the commander-in-chief, and organised in groups commanded by brigadier-generals. By the spring of 1915 this "Heavy Artillery Reserve" had absorbed part of the "Army Reserve," and all 60 pr. and 4·7″ guns were transferred to the former. We thus find that an organisation had been formed which though responsible for counter-battery work and bombardment of special defences, was entirely detached from both corps and divisional organisations. The defects of such a system, lacking both corps control and liaison with attacking troops, were disclosed by the battles of Festubert and Loos. We had evidently fallen into errors of over centralisation due to the existing shortage of heavy equipments, and our endeavour to economise our heavy fire power. The gradual increase in numbers of heavier equipments facilitated the correction of the faults which had become apparent. By the end of 1915 one heavy artillery reserve group was definitely allotted to each army, and designated as "Army Heavy Artillery Reserve Group," the remainder being still retained in the hands of the commander-in-chief. The beginning of 1916 saw a further swing of the pendulum towards the process of decentralisation, corps were now provided with a heavy artillery H.Q., whilst a system of heavy artillery group H.Q's was also formed. The latter were allotted to corps as required, when they came under orders of the heavy artillery H.Q's and were filled up with heavy and siege batteries as required.

By July, 1916, a distinct landmark was reached in the evolution of heavy artillery organisation in the shape of a recommendation addressed to the War Office to the effect that the artillery of the Expeditionary Force should be organised in three categories:

(i) Divisional Artillery — Comprising 18 prs. and 4·5″ hows.
(ii) Corps Artillery ..... — Comprising medium artillery.
(iii) Army Artillery ..... — Consisting of the heaviest natures of artillery and including all those on railway mountings.

We thus see the organisation of the artillery gradually shaking itself out into a distribution to formations based on the ranging

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powers of the equipment. (See Appendix C. published with Article No. 2.)

A further recommendation was made at the same time for the ultimate provision of the following equipments per Corps :—

24	60 prs.
60	6″ hows.
24	8″ or 9·2″ hows.
8	6″ guns.

Although the above figures were approved by the War Office, they had only been completed as regards 60 prs. and 8″ hows. by the time of the Armistice.

By the middle of 1917 the heavy artillery batteries were forced to adopt the six-gun organisation for the same reasons which had brought about a similar change in the field artillery, here again the tactical requirements were necessarily outweighed by the administrative difficulties.

It was not till the end of 1917 that the organisation of heavy artillery brigades was seriously taken in hand. It should be remembered that up to this period no system whatever of brigading batteries existed either in the medium or heavy artillery. The organisation consisted of a certain number of heavy artillery group H.Qrs. placed temporarily in command of a given number of batteries. The disadvantage of such a system had for some time become very apparent, group H.Qrs. were unable to take any permanent interest in batteries which were continually transferred from one group to another. If the system be compared to a number of infantry companies devoid of any battalion organisation, and temporarily assembled under the command of detached H.Qrs., the disadvantage of such a system becomes self evident and requires no further elaboration. Yet considerable opposition existed against any regular system of brigading of medium and heavy artillery. The opposition based its arguments on the probable difficulties which would arise in carrying out large concentrations of artillery with the necessary "roulement" entailed by such operations.

The increase in efficiency gained from the point of view of the artillery alone was recognised, but it was considered that this efficiency might be bought at too dear a cost in the loss of strategical mobility. This opposition was, however, over-ruled in favour of

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the introduction of a brigade system. By the beginning of 1918 the re-organisation was carried out, three distinct types of heavy artillery brigade being introduced :—

(i) Mobile Brigade, destined for general purposes (but especially for mobile warfare), and consisting of two 60 pr. batteries and two 6″ how. batteries.

(ii) Howitzer Brigade, for barrage and bombardment purposes, comprising three 6″ how. batteries and one 8″ how. battery.

(iii) Mixed Brigade, for counter-battery work, two 60 pr. batteries, two 6″ how. batteries, one 8″ how. battery, and one 9·2″ how. battery.

On completion of the above re-organisation a balance of ten heavy artillery group H.Qrs. remained available. These were converted into "Army Brigade, R.G.A.," and used for the control of 6″ guns, 12″ hows., 15″ hows. and railway guns, which remained unbrigaded and were allotted to army brigade, R.G.A., as required.

The above organisation remained in force till the end of the war, although later experience pointed to the advisability of reducing the different types of brigades, and the disadvantages of brigading 6″ guns and heavy howitzers such as 8″ or 9·2″ with the more mobile equipments of the nature of the 60 prs. and 6″ hows.

3. Evolution of Artillery Command.

Within the division the Great War brought about only minor apparent changes in the organisation of the command and staff of the artillery. We started the war with a divisional artillery commander provided with a brigade major, staff captain and A.D.C., and finished with an identical organisation except for a change of designation of the A.D.C. to reconnaissance officer. Although the outward signs of any change are practically negligible, there is no doubt that considerable alteration took place in the less tangible factors such as the actual status of the C.R.A. within the division. Our pre-war conception of this appointment seems to have visualised primarily the rôle of an artillery adviser to the general officer commanding the division, and to have considered the occasions on which he would exercise direct command of the artillery of the division as exceptional. By the end of the war his

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position as an actual commander had been established to the same degree as the commander of the infantry brigades of the division.

When we next turn to the corps H.Qrs. we naturally find ourselves confronted with extensive changes corresponding to the increased importance which this formation assumed during the war. As we have already seen we commenced the war with only an artillery adviser at corps H.Qrs., unencumbered by either staff or clerks. The operations of May and June, 1915, showed the necessity for co-ordination and control in the artillery beyond that of the division, and that the position of the artillery advisers at corps H.Qrs. was unsatisfactory and responsible for an element of friction and discord. An energetic performance of their duties infringed on the prerogatives of subordinate commanders and staffs, whilst a more retiring attitude resulted in their advice being either not sought for or ignored when tendered. It was nevertheless with considerable opposition that the change of status of the artillery adviser at corps H.Qrs. to "General Officer Commanding Royal Artillery of the Corps" was finally carried out in October, 1915, whilst further paper discussions ensued on the introduction of the heavy artillery commander. These matters were, however, finally settled by the end of 1916 from which date the status and control of the general officer commanding Royal Artillery of the corps remained unaltered, and consisted of "the co-ordination of the action of the artillery of the corps, and the executive command of such portions of it as the corps commander might direct from time to time."

It is now necessary to turn to the question of the corps heavy artillery command. We have already seen that in the initial stages we had fallen into errors of over centralisation of heavy artillery command. By March, 1916, recommendations had been forwarded to the War Office for the appointment of a heavy artillery commander to each corps. This recommendation was approved, and no modification was found necessary in the status and functions of the brigadier general, corps heavy artillery, up to the time of the armistice.

Turning now to Army H.Qrs., we find that the status of the Major-General, R.A., attached to the H.Qrs. of these formations followed closely the fortunes of the brigadier-general, R.A., attached

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to corps H.Qrs., but never gave rise to the same heated controversies. This was probably due to the fact that the major-general, R.A., would rarely, if ever, be called upon to exercise executive command over artillery in action, except in the case of super-heavy artillery. His final status, as approved simultaneously with that of the G.O.C. R.A. of corps, can best be described by the following extract from the official letter approving of the new designations :—

> "The Major-General, R.A., with an army will be designated—General Officer Commanding Royal Artillery—of the Army. He will, in close co-operation with the general staff, keep the army commander informed on all matters connected with the fighting efficiency of all the artillery in the army. He will co-ordinate its action both in offence and defence, issuing the army commander's instructions through the general staff of the army. He will take executive command of the whole or any part of the artillery with the army at the direction of the army commander. In such cases he will issue instructions direct to the artillery formations concerned. He will deal direct with the corps wing commander, R.F.C., and balloon wing commander, R.F.C., in all matters relating to the combined work of artillery and Royal Flying Corps."

The attached Appendix F. has been prepared to show diagramatically the growth of the chain of artillery command between 1914 and 1918. Although in the case of the artillery adviser at G.H.Q. the question of command did not arise, we find that in April, 1917, the term "adviser" was dropped, and "Major-General, Royal Artillery," was substituted. It was, however, found necessary to enlarge the sphere of action of the M.G., R.A., in order to deal with the mass of technical details concerning equipment and ammunition owing to the direct bearing such matters exercised on the tactical policy.

In December, 1917, the situation was reviewed, and the responsibilities of the M.G., R.A., at G.H.Q. were reconsidered. It was laid down that he should act as adviser to the three principal staff officers (C.G.S., Q.M.G. and A.G.) on all artillery matters, whilst his power to correspond direct with armies on the following matters was re-affirmed :—

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(i) Questions of pattern or design of artillery equipment, including ammunition.
(ii) Defective ammunition or components of ammunition.
(iii) Accidents to guns and howitzers, and to trench mortars used by R.A.
(iv) General questions affecting artillery equipment from the point of view of the user of the gun.

In addition to the above to correspond direct with the D. of A. and D.G.M.D. on matters pertaining to the functions of Artillery and on questions of experiment and research up to the point when action was required by G.H.Q.

4. The Evolution of Artillery Staff.

A minute study of the evolution of artillery staffs would serve no useful object, and it is sufficient to note that it followed closely on the heels of the evolution of artillery command. It is, however, interesting to note the fact that artillery staff officers at formations higher than the division were not graded as "G" or "A & Q" until the middle of 1917, and that a distinct opposition had to be overcome in order to introduce the change.

The study of the evolution of artillery staffs would be incomplete without reference to the introduction of the counter battery staff officer. The fighting of 1915 pointed to the necessity for some systematic method of dealing with hostile artillery, by 1916 improvised methods had been adopted to meet the new requirements, and by 1917 the appointment of a counter battery staff officer was approved, as an addition to the staff of the G.O.C. R.A. of corps. The selection of the corps as the formation in which counter-battery work should be focussed was governed by the following considerations:—

(a) The most suitable nature of equipment for C.B. work was normally under corps control.
(b) The sources of C.B. intelligence, such as R.A.F., sound ranging, flash spotting, etc., were centred on the corps.
(c) Corps frontages were of suitable extent to act as an efficient basis for counter battery control.

The official position of the counter battery staff officer is worth a moment's study, it provides us with a striking departure

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from our normal conception of a staff officer, and an example of an organisation liable to produce friction in the intricate machinery of command, as will be seen from the following facts :

(a) The C.B.S.O. was a staff officer of the G.O.C. R.A., of the corps, but owing to the nature of the work required of him, it was found necessary to establish his office at the H.Qrs. of the heavy artillery of the corps.

(b) It was his duty to advise the G.O.C. R.A., of the corps as to the guns required for C.B. purposes, but these guns had to be found by the corps heavy artillery commander.

(c) He was nominally a staff officer, but for practical purposes had to assume executive command of guns detailed for C.B. work.

(d) Whilst responsible for the tactical handling of guns detailed for C.B. work, the heavy artillery commander remained responsible for their technical efficiency, and yet the former necessarily depended on the latter.

In spite of the above defects the appointment remained unchanged until the end of the war, but cannot be considered as an ideal system.

With the introduction of counter battery staff officers the C.B. organisation made rapid progress, and extended its activities in all directions. The ramification of the system as it existed in 1918 can best be judged by the diagram given in Appendix G.

6. Evolution of French Artillery Organisation.

It is interesting at this juncture to follow the evolution of the French and German Artillery organisation with the object of examining whether it followed similar lines to our own.

The French divisional artillery organisation of three "groupes," each consisting of three batteries of four 75 guns, remained unaltered. The original twenty regiments of corps artillery were, however, subjected to important changes. In order to raise the second line divisions to full establishments, it was found necessary to reduce these regiments from four "groupes" to two "groupes." Whilst by August, 1917, instructions were issued that corps artillery regiments should be considered available for temporarily reinforcing any portion of the front, thus recognising the fact that they no longer

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necessarily formed an integral part of the corps organisation. At the same time the shortage of horses induced a further change by converting the corps artillery regiments into "Carried Artillery," namely artillery transported in lorries. This change was accompanied by an increase in the number of "groupes" to three so as to conform with the divisional artillery organisation. In the initial stages deficiencies in M.T. vehicles only admitted of one groupe being moved at a time, but by January, 1918, it was realised that such an organisation was unsuited for the requirements of mobile operations, and the decision was arrived at to provide M.T. transport for the complete regiment. By March, 1918, the first of these newly organised units was ready, and rendered such excellent service that the transportation of the remaining regiments was hastened. By the 10th June, 1918, twenty-six carried regiments had been completed out of the total of thirty-four which were finally raised. By this date all twenty-six regiments were in the line and had definitely broken all ties with their original corps organisation. It was consequently considered advisable to place them in the "Réserve Générale d'Artillerie" where they remained till the end of the war.

The initial failure to provide the divisional organisation with a field howitzer was realised at an early date, and remedied by employing heavier natures, such as the 155 short, under divisional control. By May, 1916, instructions were issued for the provision of two "groupes" of 155 short per division, a programme which was, however, never realised and reduced to one "groupe" of three batteries of four 155 shorts working under direct orders of the division.

Turning to the heavy artillery, not allotted to divisions, we find that by the programme of the 5th August, 1915, the newly formed heavy artillery, consisting of 100 tractor drawn and 400 horse drawn batteries, were to be organised as under:—

(a) 100 Tractor batteries under G.Q.G. control.
(b) 200 Horse drawn batteries under Army control.
(c) 200 ,, ,, ,, ,, Corps ,,

In 1916 the "Artillerie Lourde à Grande Puissance" (A.L.G.P.) was introduced, embodying all super guns, and under direct G.Q.G. control. In January, 1917, General Nivelle decided to unite both

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tractor batteries (A.L.T.) and the A.L.G.P. under one command designated "Réserve Générale d'Artillerie Lourde" (R.G.A.L.), General Buat being placed in command. By February of the same year the R.G.A.L. had been sub-divided into three sections:—

(a) The original A.L.G.P.
(b) ,, ,, A.L.T.
(c) Artillery manned by Marine Gunners.

The above organisation was intended to meet the requirements of the new artillery tactics which are best explained by the following translation of an extract from a lecture by Colonel Maurice at the "Centres d'études d'artillerie" at Vitry-le-François about this period:—

> "Up to the present our attacks have been directed against more or less extended fronts, but always on one single front, namely the effort of our preparation has been exerted, during long weeks, on a definite sector of the front, leaving the enemy no room for surprise, except as regards the actual hour of the attack.
>
> Larger resources of heavy artillery of a very mobile nature permit of contemplating another solution of the problem.
>
> On a front completely prepared to receive this artillery, we shall be able to give successive blows with our battering ram, shattering under our gun fire first one point, then another, until such time as we shall be able to stage a really decisive effort at a specially prepared point"

The introduction of the R.G.A.L. apparently met with some opposition and a certain feeling of mistrust, fears existed that it might constitute a "state within a state," and be tempted to wage a war of its own.[1] It is natural that this antagonistic feeling should have been apparent to its commander, General Buat, who experienced difficulties in ensuring that his orders were executed, and even his advice listened to, as regards the employment of the R.G.A.L. He consequently recommended that the command of this artillery should be placed in the hands of a general, at the head of all the artillery, and whose high authority embracing all branches of this arm, would be better received and more respected.

[1] "L'artillerie, ce qu'elle a été, ce qu'elle est, ce qu'elle doit être," by General Herr, page 73.

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We find, consequently, that on the 26th January, 1918, an inspector general of artillery was created and made responsible for the technical supervision and training of all artillery, whilst directly in command of the R.G.A.L. The latter at the same date was expanded to include one "groupe" of the horse drawn heavy batteries up to then under army control, and was re-named "Réserve Générale d'Artillerie" (R.G.A.).

Finally on the 10th June, 1918, the "carried field artillery" was added to the R.G.A., which then consisted of the following five sections :—

(a) A.L.G.P.
(b) Heavy Artillery H.T. and M.T.
(c) Marine ,,
(d) Trench ,,
(e) Carried Field Artillery.

The above change resulted in the following distribution of the Heavy Artillery :—

(a) One Groupe of 155 Short under Divisional control.
(b) One Regiment (of 1 or 2 Groupes) under Corps control.
(c) Remainder in R.G.A. under G.Q.G. control.

7. Evolution of German Artillery Organisation.

Turning to the German organisation we find the same problem as regards the provision of equipments for second line divisions. The difficulty in this case was solved during 1914 by reducing six-gun field batteries to an establishment of four guns which was retained till the end of the war.

In 1916 a uniform distribution of heavy artillery to divisions was adopted, consisting of three batteries of four 15$^{c/m}$ hows. Whilst at the same date a general reserve of field artillery was formed, it should, however, be noted that neither at this time nor at any subsequent date did field artillery form part of the organisation of the corps as in the French army.

By the end of 1916 the heavy artillery originally allotted to corps was transferred to the general reserve of artillery. Whilst towards the end of 1917 we observe a swing of the pendulum towards decentralisation. Divisions participating in the Riga offen-

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sive, and later those taking part in the western offensive of 1918, were provided with one battalion comprising two batteries of four 15c/m hows. and one battery of four 10c/m guns. At the same period army corps on the front of attack received one battalion of two batteries of three 21c/m hows. and one battery of two 15c/m guns, this allotment being doubled within a short time. It is, however, doubtful whether these battalions can be considered as forming part of the actual corps organisation, or merely as an allotment from the general reserve for a specific operation. At any rate the effect of this distribution of artillery resulted in a reduction of the general reserve of artillery; which, however, still retained 60% of the heavy artillery, whilst corps only had 6% and divisions the remaining 34%.

By the spring of 1918 the general reserve of artillery contained approximately 27% of the field artillery, but from the 15th July onwards as divisions were reduced their artilleries were absorbed by the general artillery reserve, and the proportion of field artillery was consequently raised to 31% of the total in the field.

By the 11th November, 1918, the final distribution was as under:—

243 Div. Art. of	1 Light regiment,	36	pieces, total	8,748
	1 Heavy battalion,	12	,, ,,	2,700
30 Corps. Art. of	2 Heavy battalions,	8	,, ,,	480
Gen Art. Res.	Field Artillery Reserve		,,	3,200
	Heavy ,, ,,		,,	4,400
	Super ,, ,,		,,	200

The evolution of the German artillery command deserves a few minutes examination, as it varied both from our own and from the French. During the first years of the war no artillery command existed beyond the division, and it was not till the Riga offensive of 1917 that the necessity for a higher centralisation of command was realised.

The change was apparently due to the successes which Colonel Bruchmuller had obtained against the Eastern Front. We find that for the Riga offensive the whole of the artillery was placed directly under the orders of the army commander for the period of preparations and for the first few hours of the attack. As no artillery com-

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mander existed at Army H.Q. one had to be extemporised, and was provided by maintaining a specialist G.H.Q. for this purpose. We thus find a system introduced which General Herr has aptly described in his book in the following words :—

> "A commercial traveller in methods of massed artillery command, despatched to exercise his functions in succession with the various armies concerned."

We also find in the Riga offensive the first instance of a proportion of the artillery definitely allotted for counter-battery purposes, although both in this offensive and in those of the western front of 1918 greater elasticity existed in the employment of artillery for counter battery purposes than in the English or French organisations.

Throughout the offensives of 1918 the German artillery organisation and command were based on the principle of extreme centralisation during the preparations and initial stages of the attack followed by progressive decentralisation.

From the 27th May, 1918, we find the German artillery organised under the following categories, which have a singular resemblance to that of our own and the French :—

(a) Under Div. control :—The I.K.A. (Infanterie-kampf-artillerie). Destined for direct support of attacking infantry.
(b) Under Corps control :—The A.K.A. (Artillerie-kampf-artillerie) for counter battery work, and the F.E.K.A. (Fern-kampf-artillerie) for harassing fire.
(c) Under Army control :—The S.C.H.W.E.F.L.A. (Schwerste-flachfeuer-artillerie) for distant bombardments.

8. Conclusion.

From the foregoing brief comparison of the evolution of artillery organisation and command we arrive at one interesting conclusion. We find three separate armies starting with different organisations, influenced by different factors, and following separate lines of evolution, yet all three arriving at a similar solution of the fundamental factors affecting both organisation and command of artillery. This consensus of opinion may be briefly classified as under.

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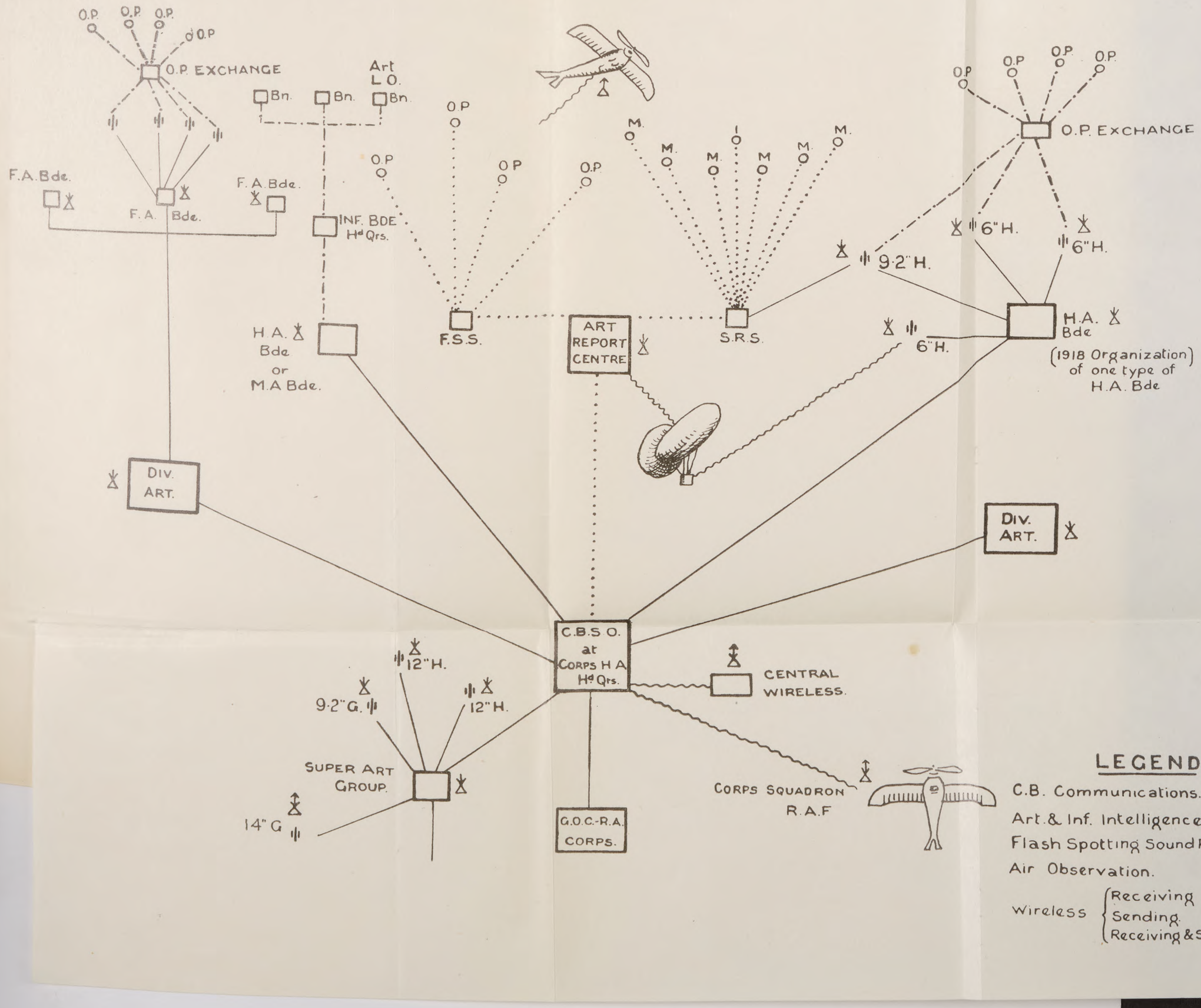
DIAGRAM OF COUNTER BATTERY ORGANIZATION. APPENDIX "G."

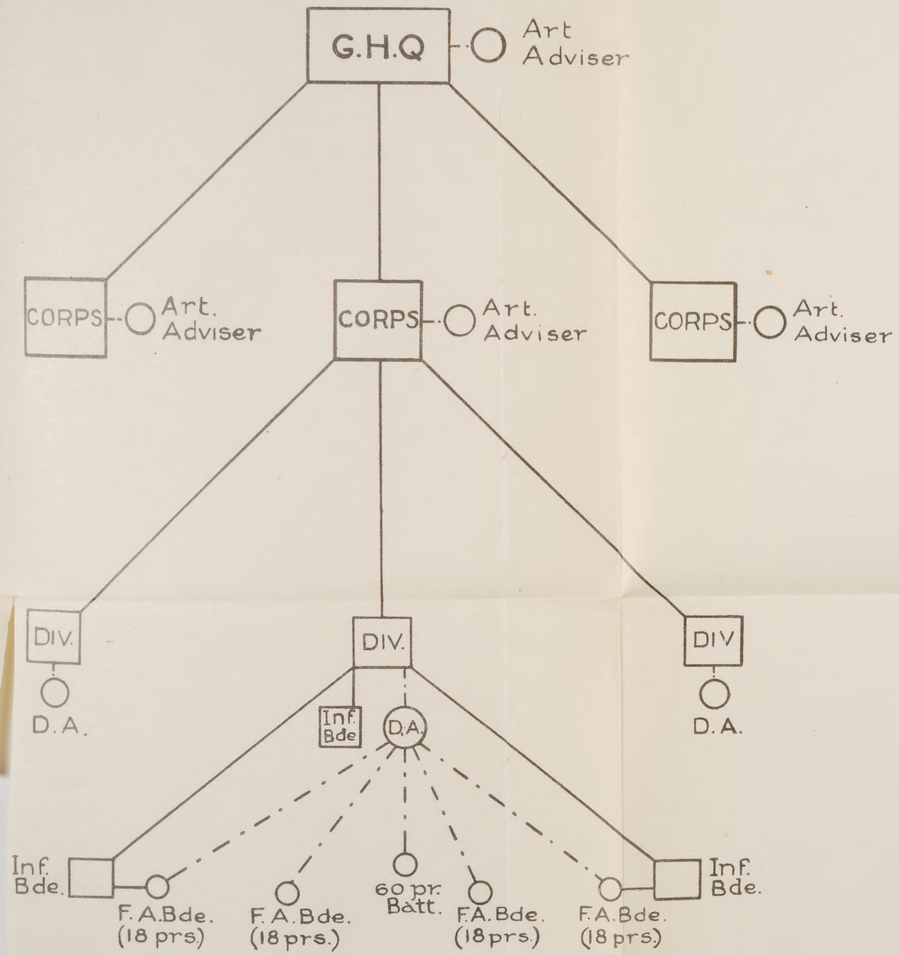


[To face page 386.

DIAGRAM OF ARTILLERY ORGANIZATION.

APPENDIX "F."

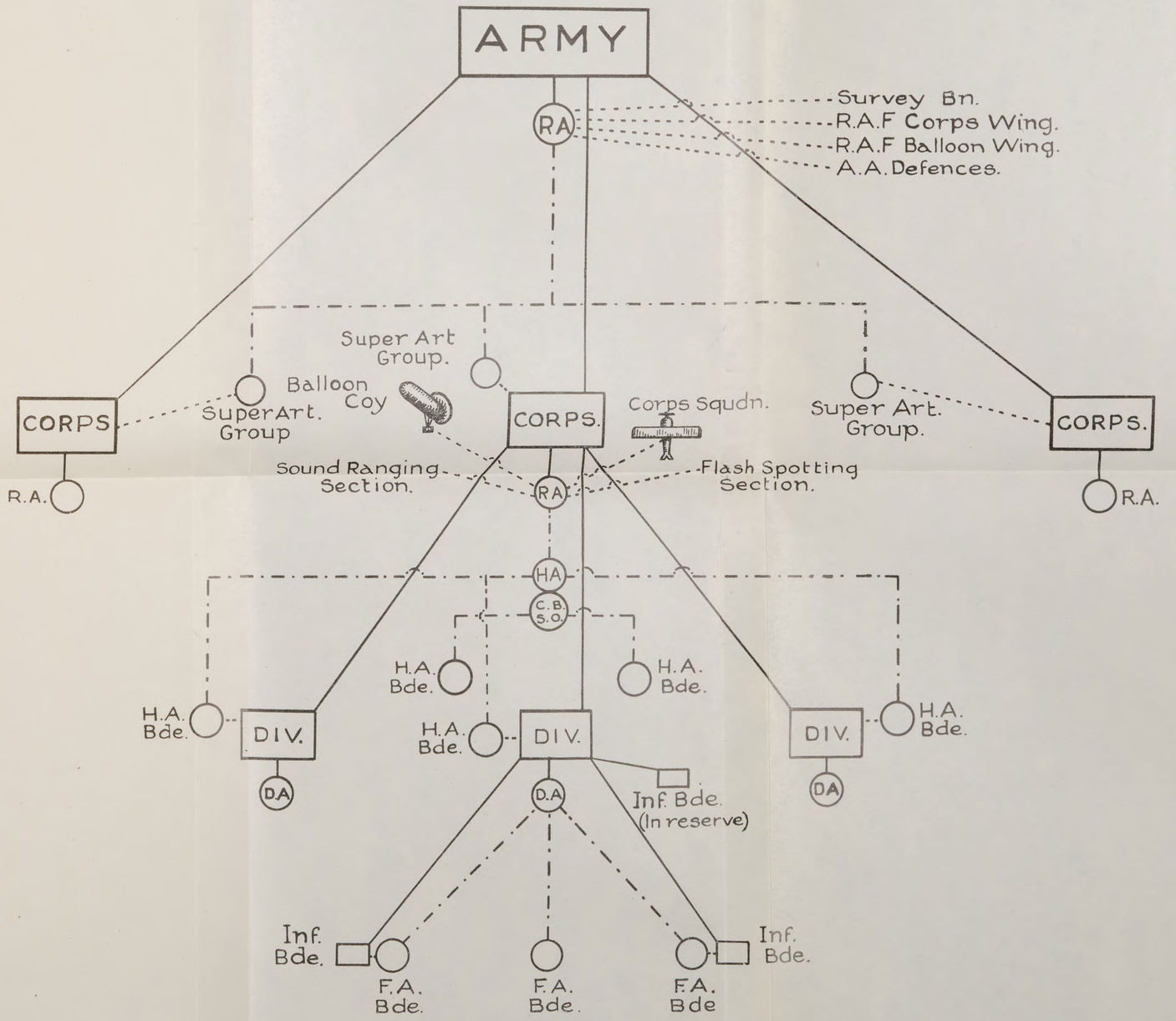
1914



REFERENCE.

- H.Qrs. of Formations.
- Artillery H.Qrs.
- —— G.S. lines of Command.
- - - - R.A.
- ----- Liason.

1918.



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command of artillery. This consensus of opinion may be brie
classified as under.

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(a) The necessity for a strategical reserve of both heavy and field artillery.
(b) The allocation of equipments to formations based on the ranging powers of these equipments.
(c) The selection of the Corps as the most suitable formation for counter battery control.
(d) The selection of the Army for the control of guns with extreme ranges and best employed on strategical tasks.
(e) And finally the necessity for centralisation of artillery command during preparations for, and initial stages of an attack, followed by decentralisation according to existing requirements.

APPENDIX E.

ORDER OF BATTLE—HORSE AND FIELD ARTILLERY, NOVEMBER 11TH, 1918.

	13 pr.	18 pr.	4·5″ h.
61 Divisional Artilleries.			
(a) 3 Cavalry	56		
(b) 51 British		1836	612
(c) 4 Canadian		144	48
(d) 5 Australian		180	60
(e) 1 New Zealand		36	12
51 Army Brigades, R.F.A.			
(f) 33 British (normal establishments)		594	198
(g) 8 ,, (four 18 pr. batteries)		192	
(h) 3 ,, (three ,, ,,)		54	
(i) 3 Canadian (including 5th Can. D.A.)		54	18
(j) 3 Australian		54	18
(k) 1 New Zealand		18	6
Total ...	56	3162	972

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SOME PROBLEMS OF TERRITORIAL FIELD ARTILLERY.

By Major R. A. E. Voysey, R.A. (T.A.).

With the exception of the 1912 Manœuvres, the writer had no experience of the Territorial Army before the War, but 2½ years' subsequent experience as a territorial battery commander has not led him to modify his pre-war opinion that it is impossible to create efficient field artillery on a territorial basis. If "efficient" is construed as "fit to take the field at the outbreak of war" few territorial officers are likely to quarrel with this opinion. These notes are written with two ends in view. First, to give regular officers an idea of the peculiar difficulties encountered by the territorial branch of the regiment and suggest the lines upon which they can help to overcome them; secondly, in the hope that other territorial battery commanders will be tempted, in reply, to state their views on the subject and to suggest the best means of coping with the handicaps which must be inseparable from all second-line troops. As conditions vary so much througout the country, it must be clearly understood that the following remarks are made from the point of view of a battery raised in a city where there is, at the moment, no regular field artillery. Granted that "efficiency," as defined above, is practically unattainable, we are faced with two questions; "What is the standard required of us?" and "How near to that standard can we and have we attained?"

From a recent speech by the Minister for War it appears that on mobilization each battery will be required to expand into two but we are not told how soon these batteries will be expected to be ready to take the field. Presumably only a cadre will be withdrawn from the original battery. As year by year the number of war-trained men available in an emergency decreases and the value of their previous training deteriorates, so the difficulty of this expansion will increase. If these premises are correct, a very high standard of efficiency is required of the individual territorial soldier if the battery is to retain its cohesion on mobilization and be of

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any fighting value within the first three months of war. Put shortly the ideal to aim at is that not only must all the specialists and N.C.O's on the establishment be as highly trained as circumstances will allow, but every effort must be made to create a second staff and a reserve of potential N.C.O's. So far as existing units are concerned, it should be possible except in most unfavourable circumstances to train the firing battery up to a very fair standard of fire discipline, if not of manœuvre also, but the provision of this reserve is another matter altogether. How closely the territorial artillery has approached this standard it is not for a territorial officer to say, but it is greatly to be feared that, with the time and facilities at present available, to attain it is almost impossible. What are the chief sources of weakness with which we have to contend? They seem to be as follows though, possibly, many will not agree with the order in which they are placed:—

(1) The officers.
(2) The battery staffs (including tradesmen).
(3) Lack of discipline.
(4) The N.C.O's.
(5) The drivers. (The training of the gun detachments does not present the same difficulty, as the bulk of the work can be done during the winter under cover or on the square in the spring evenings).

(1) The officers. In all probability the majority of majors and captains have had war service, but the percentage who have had any experience of moving warfare must be relatively small; the proportion of subalterns with war service of any kind is probably smaller still. How is the requisite knowledge to be kept up or acquired? It must be remembered that the majority are engaged in the professions or in business and that, even where they can spare the time for attendance at courses of instruction or attachment to regular units, in many cases such attendance either directly or indirectly involves financial loss. Let us consider the existing facilities for training outside the unit. As regards the two senior ranks, there is probably very little value to be got out of an attachment; no one can expect to have a regular battery turned over to him for a week or a fortnight to play with, and the mere spectator rarely learns very much. In their case, it is not so much theory

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as actual and continuous practice under a competent instructor that is required. More especially are opportunities of training with other arms lacking. A great deal can be learned from tactical exercises but the printed slip can never take the place of personal observation and liaison, still less teach the art of watching the tactical situation for oneself. Excellent though the courses at Larkhill are, the fact that they are attended by officers of all ranks and varying experience makes it necessary for a great deal of time to be spent on matters that are already known to the seniors, and the time available for tactical training has to be correspondingly reduced. The writer suggests that "combined training" for batteries, unless carried out in addition to and in immediate succession to their annual training, would be sheer waste of time and money in their present state but that, if the funds available would allow the officers and staffs to take part in divisional training or army manœuvres (either under their own brigade commanders or attached as extra batteries to regular brigades) the extra cost to the training grants would be money well expended.

The above remarks as to the value of attachment apply to a very great extent in the case of subalterns also. The greater number know absolutely nothing when they join and, with all the keenness and intelligence in the world, they cannot learn their job as section commanders during annual training, when such officers and N.C.O's as have really known their work in the past are trying to get rid of the cobwebs and knock men and horses into some sort of shape as quickly as possible. Nothing can quite take the place of being a member of a unit which is running smoothly and in which they can see how any particular thing really should be done. Unless the junior subaltern can be given charge of a section of a regular battery to learn from his Nos. 1 (as the writer did), or handed over to an experienced section commander who will take an interest in him and see that he really does learn something, his time as regards horsemastership and interior economy will very largely be wasted. This, in the writer's experience, has been the hardest part of his task in the training of his subalterns. Manœuvre, gun drill, fire discipline, etc., etc., can, within limits, all be taught in the drill hall and polished up at courses of instruction and during annual training.

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(2) The Battery Staff. The difficulty of finding a really good battery commander's assistant or gun position officer's assistant is probably common to both the regular and territorial branches of the regiment. Suitable men are few and far between and, when found, are generally badly needed for some other job. Here again, the opportunities for tactical training are rare and liable to be wasted when there are no other troops on the ground.

This battery may or may not be unfortunate as regards signallers, but the recruiting of this portion of the staff is the most trying of the many problems that arise during the year. Short initial attachments to a regular unit are being tried in the brigade and should go a long way towards a solution but, unfortunately, the men who are most likely to profit by instruction cannot, as a rule, spare the time to take part. When the amount of training given to the regular signaller is considered, it becomes obvious that the territorial must possess a very high standard of intelligence if he is to become at all efficient. Whether it is that such men do not exist in the classes from which the battery is recruited or whether the knowledge required for classification is so extended that the amount of work involved is out of all proportion to the inducements to specialization as signallers, the fact remains that, except over very short distances, communication fails either in speed or accuracy nine times out of ten. One feels that the efficiency of territorial batteries in this respect would be immensely improved if the requirements as to procedure, etc., in the classification tests were cut down to the minimum necessary for communication within the brigade and the signallers were left free to devote their whole time and energies to becoming proficient in the care and use of the equipment.

The 15 days' camp is reduced in practice to 10 working days and in this short time it is useless to try to train the staff and firing battery together; one or other spends half its time waiting for the mistakes of the other to be corrected. In the circumstances, the wisest plan seems to be to carry out the tactical training of the staff on Sundays and holidays, both before and after camp, and to hand over the signallers whilst in camp (except for one or at most two drill orders) to the brigade for purely technical instruction. (Obviously this remark does not apply to the years when the battery trains at a practice camp.) A very great deal of progress can be

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made by these short regimental exercises but in their case also the extra freedom gained by working in a manœuvre area and the practical experience of establishing and maintaining communication with due regard to the movements of other troops would be of the greatest possible value.

The provision of farriers is another problem. Not only have many forges been closed since the war but the remainder are running with reduced staffs and it is, in most cases, quite impossible for the employer to allow his men to join the territorial army. The farriers must be men who follow the trade in civil life and any attempt to train men in the battery is doomed to failure. Even the war-time shoeing-smith has lost his skill since demobilization, is to all intents and purposes useless, and is not worth enlisting as a tradesman. No doubt many of these men will rejoin in an emergency and will require less training than novices. In the meantime the battery which is up to establishment in this branch is exceedingly lucky. Good fitters and saddlers can be enlisted without much difficulty.

(3) Lack of discipline. The heading of this paragraph must not be taken to imply breaches of discipline in the ordinary sense of the word; on the contrary, making allowances for the holiday spirit, the conduct of the men in camp is excellent and the minor offence report is a rare visitor to the office table. The trouble makes itself felt outside the period of annual training and is due to the fact that the battery commander has no power to compel his men to attend more than the statutory number of drills (twenty in the case of a "trained soldier," obviously quite insufficient in the majority of cases), nor even to order them to attend for drill on any particular days. The consequence is that, whilst a certain number of men, mostly those who least need it, attend as many drills as they possibly can, the majority are content with the minimum laid down, and a few, either from a deliberate desire to evade their obligations or from procrastination, fail to perform that minimum. These last are simply a drag on the wheel and are best discharged as soon as their attitude is clear; as a rule they manage to produce an apparently valid excuse for not attending camp and, when they do attend, are more bother than they are worth. There is power to prosecute in such cases but the courts do not seem to be very

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sympathetic and it is not worth while to exercise the power. The inevitable result is that any programme of progressive training is bound to fall through, to the discouragement, not only of the officers and permanent staff who are responsible for carrying it out, but also of the select few who manage to attend regularly and are kept back for the purpose of going over the same ground for the benefit of those who have not been so regular. It is too much to hope that in the future it may be possible to recruit the territorial army on a partially militia basis? The value of a six, or even a three-months', training such as the special reserve recruit received would very quickly be reflected in the efficiency of the units; not only would the recruit have a sound knowledge of drill on joining the battery but, more important still, he would have acquired the habit of discipline. Another possible solution of the problem is less open to the objection of increased cost; it is to introduce a system of a greatly reduced bounty in the case of all future enlistments with the addition of a small sum for every drill performed in excess of the minimum, the total amount that could be earned to be in excess of the present bounty; men who re-engage could be given the option of serving under either the present or the new conditions. At present there is no real inducement to a man, after the first enthusiasm has worn off, to do more than he is compelled to, and the minimum will neither make nor keep him efficient. Undoubtedly, the force of example is very great and the effect of regular attendance on the part of the officers is most marked, but something more is needed if progressive training is to be undertaken with success.

Given the necessary funds and suitable premises, a great deal can be made out of the social life of the battery. Unfortunately, social functions are expensive and the only sources of supply are the pockets of the officers and the inhabitants of the district, neither of whom can as a rule contribute very much nor should, in common justice, be called upon to do so.

(4) The N.C.O's. The problems incidental to the training of N.C.O's are very similar to those involved in the training of junior officers. Time and careful selection will usually produce sufficient good ex-regular or war-trained non-commissioned officers for battery sergeant-major, battery quartermaster-sergeant and Nos. 1, but it is the junior non-commissioned officer who is the weak spot,

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most noticeably in matters of interior economy. It is easy enough to teach him drill, etc., but his opportunities of actually carrying out the duties of his rank are too few and too short to enable him to learn the knack of getting the best out of the men under him and so qualifying for further responsibility. A further disability is that in some cases he is hampered by the possible effect of a rigid enforcement of discipline upon his civil life; the larger the recruiting area, the less this is likely to occur but it remains a factor which may have to be reckoned with in individual cases. Another trouble is that lance ranks are not paid and it becomes increasingly difficult to persuade men of the right stamp to take the stripe. From the point of view of the future, the desirability of filling the higher non-commissioned ranks with discharged regular non-commissioned officers is open to question, but at the same time it is only the exceptional man who can be made into a reliable No. 1 under present conditions and it seems that there is no other course open if these ranks are to be filled adequately.

(5) The Drivers. At present this particular battery is exceedingly well off for old drivers and others are still re-enlisting slowly, but the supply must be nearing exhaustion. The training of the recruit driver is a serious problem, which will become worse as the leaven of old hands grows less. Even where the horses of a regular battery are available, the time spent in collecting them, harnessing up, reaching the drill field, etc. (unless teams and vehicles can be taken over complete on the spot), is so great that very little time is left for actual drill or manœuvre. When hired horses have to be used for this purpose, the attempt to train men and horses simultaneously would be ludicrous if it were less dangerous.

The system of using hired horses in camp is one of the worst handicaps in this part of the training. Apart from the difficulty and risk of training recruits on untrained and often vicious horses, an enormous amount of valuable time is wasted in shuffling horses until teams are found which will work more or less decently together. Again very few hired horses have seen either a brush or a clipping machine within the memory of man and the labour necessary to make them in any degree presentable for parade is a severe tax upon men who are, in most cases, not used to horses. Considering the average batch of hired horses and the relative inexperience of

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the men, it is a matter for congratulation that serious accidents are so few and that the driving is, on the whole, presentably carried out. Even if a battery is up to establishment, it will rarely be at full strength in camp, and to get through a practice camp with about 70 men and indifferent horses means very hard work, even under the most favourable weather conditions; when these are bad the task is appalling. Whether or not it is at the moment practicable, there can be no doubt that it would be an invaluable help to territorial batteries to have the use of the horses of regular units for their annual training. This problem, of the provision of horses and the training of drivers, is one of the most potent arguments in favour of the mechanicalization of territorial field batteries but the gain in this respect would be more than balanced by the loss in others. Quite apart from the fact that the keenest men in the battery are very often to be found amongst the drivers (and not one in ten would willingly be mustered gunner), a territorial battery must from its constitution have an intense *esprit de corps* and pride in its appearance on parade if it is to be of any real value. The result of "spit and polish" is most marked in this respect and the effect of rolling about the country behind lorries plastered with advertisements of Beecham's Pills, etc., need hardly be described!

In conclusion the writer hopes that nothing he has written will be taken as a complaint against regular officers for lack of assistance. His experience has been that reasonable requests for horses or help in other ways are always met, but, unfortunately the days and hours when their horses would be of most use to the territorial unit are precisely those which would most interfere with the off-duty hours of the men of the regular battery. If his plea for the attached officer may be taken to heart, he will be grateful; he has been both bear and leader and knows that there are difficulties on both sides. Still less has he any desire to decry the territorial. With very few exceptions, both officers and men are remarkable for the keenness and goodfellowship with which they approach their work; it is surprising how rapidly the batteries settle down in camp and, considering the conditions under which the units are formed and trained, they deserve to be congratulated on the progress that has been made rather than blamed for the mistakes, often laughable, which accompany their public appearances.

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ARTILLERY BRIGADE TACTICAL EXERCISES.

By Bt. Lt.-Col. E. C. Anstey, d.s.o., R.A.

I. ATTACK.

Opening Narrative.

A Southland Force of a Cavalry Brigade and two Divisions with certain Corps troops moving northwards astride the River Bourne has come in contact with the Advanced Guards of a similar Northland Force moving southwards. The 2nd Southland Division, having been delayed on their march by a severe hostile air attack, gained contact with the enemy some hours later than the 1st Division on their right. On the arrival of the Southland Advanced Guards the Cavalry Brigade was withdrawn to the left flank.

At 0900 hours on the 1st June the situation is as follows:—

1st Southland Division is heavily engaged to the east of the River Bourne facing northwards with its left checked at the south exits of Collingbourne Ducis.

The 4th Infantry Brigade (Advanced Guard of 2nd Southland Division) has failed to clear Hougoumont Farm but has established itself on Hill 145 in Sq. 62 and on Weather Hill (Sq. 41). The artillery of the advanced guard is in action to the S.E. of Sidbury Hill. The cavalry brigade is in touch with the enemy on Longstreet Down, Lidbury Camp and further to the west.

The 2nd Divisional Commander has ordered an attack on Hazleberry Plantation—Everley as a first objective, further operations aiming at the envelopment of the enemy's right flank in conjunction with the cavalry. 5th Inf. Bde. on the right, 6th Inf. Bde. on the left. Starting Line S. point of Barrow Plantation—Tumulus in Sq. 51—Weather Hill. Dividing line between brigades Sidbury Camp—Snaildown Square—Lower House Farm—Marlborough Road Plantation (all inclusive to 6th Inf. Bde.). Hour of start 1200 hours.

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At 0900 hours the C.R.A. has just finished giving his verbal orders to his Artillery Brigade Commanders on the slopes of SIDBURY HILL. Extracts from these orders concerning the 10th Field Bde. are as follows:—

Position. Anywhere west of interbrigade boundary and north of dotted track running from the DITCH 5412 to CROSS TRACKS 3905 thence north of a line westwards.

O.P's must be in same area but not above 190 contour on SIDBURY HILL.

Zone of Fire. HILL 160 (Sqs. 54-64) inclusive to CHISENBURY WARREN (Sq. 14) inclusive.

Zone of Observation. HILL 160 (exclusive) to HILL 170 (Sq. 24).

Zone for air calls. LL calls only between N & S lines through Points 5020 on the right and 2520 on the left.

TARGETS.

	Target No. B1.	B2.
No. of Batts. ...	Three 18 pr. batts. ...	All.
Target	Shoulder of GORE DOWN from 610382 to 567396.	HOTEL (incl.) to WINDMILL COTTAGES (incl.).
Time	1200—1205	For six minutes at an hour to be notified later.
Rate of Fire ...	Two rds. per gun per min. at an irregular rate	At six rds. per gun per min. in bursts of G.F.
Nature of Ammunition ...	50% shrapnel, 50% H.E.	18-prs. shrap., hows. 101 fuzes.

Other targets by arrangement with 6th Inf. Bde. to which 10th Field Bde. is affiliated and under whose orders it will come as soon as EVERLEY is captured. The brigade will not expend a total of more than 160 rounds per gun without reference to the C.R.A.

Other portions of the C.R.A's orders affecting the 10th Field Bde. are as follows:—

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(i) Counter battery work is being arranged by Corps mainly with medium artillery.

(ii) The fire of the 10th Bde. on Target B2 is being extended to the east by four 18 pr. batteries and in depth by two 4·5″ batteries and one 6″ how. battery engaging the strip of wood near COOMBE COTTAGES, MANOR HOUSE and wood leading to RECTORY.

(iii) Certain details such as position of A.R.P., Main and Advanced Dressing Stations, C.R.A's Report Centre near Divisional Report Centre on slopes of SIDBURY HILL, Main Divisional Artery, SIDBURY CAMP—DITCH—and eventually ALMA CLUMP (Sq. 43).

Before the C.R.A. has finished giving out his orders the O.C. 10th Field Bde. sends word to his battery commanders to meet him at the cross tracks at 4406 and appoints a suitable rendezvous for the batteries to move to S.W. of SIDBURY HILL.

The O.C. 10th Field Bde. (Lt.-Col. Gunner) joins the O.C. 6th Inf. Bde. (Col. Smith) on the spur in S.E. corner of Sq. 41 at 0915 hours, informs him in detail of the artillery support he is receiving and remains with him while he is carrying out his reconnaissance and forming his plan. Col. Smith informs him that from information obtained from the advanced guard commander, the commander of the left battalion of the advanced guard on WEATHER HILL, aeroplane reports and observation, the enemy has been located as follows:—

(a) Elements of an infantry battalion in WEATHER HILL FIRS supported by a machine gun suspected as being in the bank of the pond about 3630. This infantry probably belongs to the battalion that was driven off WEATHER HILL in considerable confusion with a loss of 150-200 including 40 prisoners.

(b) Movement has been observed about SNAIL CLUMP, Point 160.6 (Sq. 33), out from EVERLEY towards LOWER HOUSE FARM buildings most of which are out of sight, and near WINDMILL COTTAGES.

(c) A patrol pushing forward from HILL 145 came under machine gun fire from the direction of HAZELBERRY PLANTATION.

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(d) WEATHER HILL and the DITCH running east have been intermittently shelled by a light gun and a light howitzer battery. What are probably two light gun batteries and a light howitzer battery are now registering WEATHER HILL and HILL 145. No medium or heavy shell have yet been seen falling west of the R. BOURNE.

(e) The head of a long column was on the MARLBOROUGH road at SOUTHGROVE FARM (Sq. 68) moving S.E. at 0855 hours and at the same hour a battery was seen moving S.E. just north of AUGHTON DOWN (Sq. 56).

The 6th Inf. Bde. plan having been evolved, Col. Smith says to Lt.-Col. Gunner :—"I shall attack through SNAILDOWN SQUARE and WEATHER HILL FIRS with one battalion (1st D.C.L.I.) on the LOWER HOUSE FARM locality which they will consolidate while, on the left, the 2nd K.O.Y.L.I. will first secure the neighbourhood of the pond on EVERLEY DOWN SPUR (3630—called POND SPUR), and then will attack EVERLEY from the S.S.W. Objective MARLBOROUGH ROAD COTTAGES to CHURCH HILL PLANTATION. The 3rd K.O.S.B's will follow the K.O.Y.L.I. to about the OLD CHALK PIT in Sq. 32 and the 4th S.W.B's to near BEACH'S BARN WARREN, both battalions remaining in reserve. I shall use them either to exploit success by leapfrogging the K.O.Y.L.I. or to extend the turning movement to the west. I shall brigade the M.G's of the S.W.B's to fire from positions on the west spur of WEATHER HILL in support of the left of the D.C.L.I. by sweeping EVERLEY DOWN and helping the first phase of the K.O.Y.L.I. attack (i.e. on POND SPUR). During the second phase I shall use them to enfilade the west edge of SCHOOL PLANTATION and to engage any enemy appearing in the open on EVERLEY DOWN or counter-attacking to the left of the D.C.L.I. in LOWER HOUSE FARM locality.

I have a section of tanks at my disposal. I am hoping that the D.C.L.I. will be able to take their objective without tank assistance and I do not want to involve the section in the woods and amongst the houses of EVERLEY. I want to retain them therefore for exploitation round by my left.

In addition to the concentrations arranged by the C.R.A. I want you to put not less than two batteries including your howitzer battery onto the LOWER HOUSE FARM locality and to continue to

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shell EVERLEY as the K.O.Y.L.I. approach it. I also want the K.O.Y.L.I's left protected if necessary during their attack. No doubt other useful targets will occur to you. Please think out your plan as quickly as you can and let me have it if possible before you give your orders to your batteries. I should also like your advice as to how best to use the 21st Pack Battery which is under my orders for close support. My Report Centre will be somewhere on this spur where we are now standing, moving to the north part of COOMBE DOWN as soon as POND SPUR is captured."

It is now 0945 hours.

Problem. As O.C. 10th Field Brigade appreciate the situation and give the plan you will submit to the O.C. 6th Inf. Bde. for his approval.

Solution.

An appreciation has been forming itself in Lt.-Col. Gunner's mind during his discussion with Col. Smith. It remains for him to round it off from the artillery point of view. In order to make the appreciation clear it is given here in toto and in logical sequence.

Before beginning Colonel Gunner sees that the attacks of the two battalions are out of sight and practically independent of one another after WEATHER HILL FIRS have been passed: that the ground makes the support of the D.C.L.I. a problem requiring very careful examination, whereas the K.O.Y.L.I. attack is the most important. He hears that the O.C., D.C.L.I. is going up to SIDBURY CAMP to get the best possible view of the ground he is attacking over, whereas the O.C., K.O.Y.L.I. is going to reconnoitre from near the Tumulus west of WEATHER HILL. He decides therefore in advance that it will obviously be desirable to affiliate a battery to the D.C.L.I.; he selects one of his 18 pr. battery commanders (who have now reached their rendezvous), tells him the situation so far as it affects the D.C.L.I., and instructs him to find the C.O. and to study the problem of how to give him artillery support, one section of pack artillery being available if required. The B.C. is to report to him his proposals as soon as arrived at.

Col. Gunner then gallops across to the western slopes of WEATHER HILL with the O.C., K.O.Y.L.I. who has just received the brigade commander's verbal orders. The O.C., K.O.Y.L.I. has

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sent his Intelligence Officer over to some cavalry whose horses can be seen at BAKE BARN (Sq. 22) to find out what they have observed of the enemy towards EVERLEY and hears that a cavalry patrol has established itself in BADEN'S CLUMP. Hostile cavalry are opposing all further attempts of our cavalry to advance. The Officer Commanding the battalion of the advanced guard in the WEATHER HILL area is also consulted and as a result of the information gathered and of a study of the ground the K.O.Y.L.I. plan of attack is formed in brief as follows :—

Phase 1. (Capture of S.W. end of POND SPUR.)

"A" Company, supported by the brigaded machine guns and by a sub-section of Cavalry V.G. from COOMBE DOWN, to move up the valley from HAXTON O and attack POND SPUR from the south passing a line drawn due west from WEATHER HILL at 1200 hours. After capture to consolidate as far forward up EVERLEY DOWN as possible. "B" Company meanwhile to move to the neighbourhood of BEACH'S BARN WARREN and "C" Company to HAXTON O.

Phase 2. As soon as POND SPUR is secured "B" and "C" Companies move up the valley to the track between the OLD CHALK PITS where they form up, "C" on the right and "B" on the left, and attack EVERLEY. Dividing line up the bottom of the valley from 3230 to corner of field 4446. "B" Company to be prepared to form a defensive flank to the N.W. "D" Company to near OLD CHALK PIT (2929) in reserve. One section M.G's to support attack from POND SPUR, one section from northern spur of COOMBE DOWN. Lt.-Col. Gunner hears the views of the O.C., K.O.Y.L.I. as to where artillery support is most needed, gallops back to SIDBURY CAMP and hears the result of the consultation between his B.C. and the O.C., D.C.L.I. It is now 1015 hours.

The appreciation which has been forming itself in Lt.-Col. Gunner's mind and which he is now in a position to round off is as follows :—

1. I must be prepared to carry out the following tasks :—
(a) Support the D.C.L.I. into LOWER HOUSE FARM locality.
(b) Help K.O.Y.L.I. to take POND SPUR.
(c) ditto EVERLEY.
(d) Protect the K.O.Y.L.I's left during this attack.
(e) Help the Bde. to hold EVERLEY when taken.

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(f) Be ready to co-operate in further operations whether exploitation or an extension of the battle to the left.

2. As regards the enemy he is likely to have M.G's :—

(i) Near WEATHERHILL FIRS shooting down the valley S.W.

(ii) Up the re-entrant in S.W. corner of Sq. 54 shooting across the front of LOWER HOUSE FARM.

(iii) Somewhere near the HOTEL shooting past and between the CLUMPS.

(iv) Towards MALBOROUGH ROAD COTTAGES shooting S. and S.E.

(v) On WINDMILL COTTAGE Spur.

(vi) At the head of the valley near the word EVERLEY.

(vii) If there is any extension of the front by the enemy, M.G's will be in and about LOWER EVERLEY.

The tasks of watching for and engaging such M.G's must be clearly allotted to batteries.

The most likely directions for hostile tank attacks are (a) from my front down the valleys and spurs in a S.E. direction against the 5th Inf. Bde., or (b) against our left between EVERLEY and the woods north of it and JENNER'S FIRS (Sq. 14). My anti-tank defence should therefore be stronger on the left than on the right. As the enemy may also extend his right towards LOWER EVERLEY I must evidently be ready to put all my fire if required on that flank and I must watch it carefully.

The enemy are likely to put up a strong resistance inside the EVERLEY locality where observed artillery fire on them will be difficult. Close support guns will be required here. These considerations suggest that one pack section should closely support the D.C.L.I. and the remainder of the battery the K.O.Y.L.I. (A six-gun battery is pre-supposed.)

3. Our own covering M.G. fire is going to be very good in the first stages of the attack up to the trees and enclosures of EVERLEY on which therefore, and on targets wide to the flanks, my guns should fire leaving the open ground to the M.G's. The exception to the excellence of M.G. covering fire is on the right where the D.C.L.I. will have no such fire after they top the SNAIL CLUMP spur until they succeed in getting a machine gun forward to beyond WEATHER HILL FIRS. Much of the LOWER HOUSE FARM locality

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however is screened from the south by a fold in the ground and our M.G. fire, when established, will be effective only along the S.E. face of the farm enclosure. It will also be when crossing SNAIL CLUMP spur that the D.C.L.I. will come under the fire of the enemy's M.G's (ii) and (iii) above, as well as of rifles and automatics from the LOWER HOUSE FARM locality itself. This therefore is a critical period of the attack which demands full artillery support and may occur soon after 1215 hours.

I have already noted the exposure of the K.O.Y.L.I's left during their attack and the necessity for watching it.

K.O.Y.L.I. Report Centre is going to be first near BEACH'S BARN and later on north spur of COOMBE DOWN. These would be suitable also for a B.C's report centre.

4. Much of the ground east of the line WEATHER HILL—EVERLEY is exposed to the enemy to the N.E. In fact I cannot pass a battery to the east of the SIDBURY HILL—WEATHER HILL ridge without exposing it to view. Positions for my batteries exist on HAXTON DOWN (3000 yds. from EVERLEY) and on COOMBE DOWN (2000 yds. from EVERLEY) with O.P's on the latter and on the slopes of WEATHER HILL. HILL 145 would give some view towards LOWER HOUSE FARM but will be under heavy fire until our infantry make progress. The C.R.A's orders however allow me to use up to about the 190 contour of SIDBURY HILL.

The HAXTON O valley offers an excellent line of advance towards EVERLEY.

5. From these considerations I arrive at the following plan :—

(A) D.C.L.I. requires close support of one pack section for the capture of LOWER HOUSE FARM, the remainder of the pack battery closely supporting the K.O.Y.L.I.

(B) One 18 pr. battery affiliated to D.C.L.I. watching particularly for machine guns in the valley running down from S.W. corner of Sq. 54 (called Valley 54) and the other likely looking places on the D.C.L.I. front.

(C) Following fire on LOWER HOUSE locality :—

4·5″ battery on LOWER HOUSE FARM.

One 18 pr. battery on LOWER HOUSE CLUMP and ALMA CLUMP.

One 18 pr. battery on S.E. front of HOTEL.

Pack section on CHALK PIT buildings.

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Above to fire for five minutes from 1215 hours or when leading infantry seen to cross SNAIL CLUMP spur.

(D) Ask C.R.A. to ensure that other artillery fire is on the south slopes of GORE DOWN from 1215 to 1230.

(E) One 18 pr. battery on POND SPUR about Pt. 160.3 from 1200 to 1210 hours, intermittent or as observation shows necessary. This battery affiliated to K.O.Y.L.I.

(F) When "B" and "C" Coys., K.O.Y.L.I. reach line N.W. and S.E. through POND on POND SPUR (probably not before 1245 hours).

(i) One 18 pr. battery SCHOOL PLANTATION. This battery then to advance to OLD CHALK PIT in Sq. 32 and come under command of K.O.Y.L.I.

(ii) One 18 pr. battery WINDMILL COTTAGES and hedges to N.W. of it. This battery also responsible for watching the battalion's left flank.

(iii) 4·5″ battery RECTORY and road to S.E. for 400 yards.

(G) Close support guns with K.O.Y.L.I., until EVERLEY is reached will watch particularly for the anticipated M.G's near WEATHER HILL FIRS, WINDMILL COTTAGES and south edge of EVERLEY.

(H) All fire to be as far as possible by observation, battery commanders being free to turn off the above targets if more favourable and important ones disclose themselves, reporting such action forthwith.

(I) As soon as the 4·5″ battery has to cease fire it will register west end of WINDWARD BALL PLANTATION.

By 1040 hours Lt.-Col. Gunner had submitted his plan to O.C. 6th Inf. Bde. who approves, provided that some fire is put on the POND and POND SPUR during "A" Coy's attack for moral effect. Lt.-Col. Gunner is then ready to issue his orders to his battery commanders. He does so verbally in the following manner:—

I am naming the following features:—

HILL 145 in Sq. 62.
VALLEY 54, S.W. corner of Sq. 54.
POND SPUR, S.E. part of Sq. 33.
HAXTON VALLEY, from HAXTON O to LOWER EVERLEY.
CHALK PIT FARM, 4835.

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VALLEY 33, running from EVERLEY to S.W. corner of Sq. 33.
LOWER HOUSE FARM locality includes the farm and neighbouring buildings and LOWER HOUSE and ALMA CLUMPS.
The EVERLEY locality includes the triangle SCHOOL PLANTATION—MALBOROUGH ROAD COTTAGES— CHURCH HILL PLANTATION.

1. (a) The enemy held up our advanced guard at HOUGOUMONT FARM and roughly on a line west of it. The 1st Division on our right has made progress but is fighting hard for COLLINGBOURNE DUCIS in which direction the enemy appears to be deflecting his reinforcements. Enemy have been located as follows :—Infantry in WEATHER HILL FIRS (small bodies), LOWER HOUSE FARM and EVERLEY machine guns probably by POND on POND SPUR and near HAZLEBERRY PLANTATION : light guns and howitzers have been shelling WEATHER HILL from unlocated positions.

(b) The division is attacking at 1200 hours, 5th Inf. Bde. on the right, 6th on the left. We are affiliated to the 6th Inf. Bde. Brigade objective further edge of EVERLEY up to MARLBOROUGH ROAD COTTAGES. Dividing line N. and S. line through SNAILDOWN SQUARE. Starting line approximately E. and W. line through pond on WEATHER HILL. Brigade formation, D.C.L.I. on right, K.O.Y.L.I on left. Dividing line, track WEATHER HILL to HOTEL, thence road and belt of trees to MARLBOROUGH ROAD COTTAGES exclusive to D.C.L.I. Machine guns of one battalion brigaded and firing to protect D.C.L.I. left, in support of K.O.Y.L.I. attack on POND SPUR and later enfilading west face of SCHOOL PLANTATION. Close support guns will be with each of the leading battalions. 1st Cav. Bde. is on LONGSTREET DOWN, LIDBURY CAMP and further to the west, with a patrol established at BADEN'S CLUMP.

2. The 10th Field Bde., R.A., will support the 6th Inf. Bde. attack :—

(i) Under orders received from C.R.A. by timed concentrations (a) on GORE DOWN (b) on UPPER EVERLEY and EVERLEY.
(ii) By a concentration on LOWER HOUSE FARM locality.
(iii) By observed fire on POND SPUR and WINDMILL COTTAGES SPUR.

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(iv) By protecting the left flank of the K.O.Y.L.I. attack if required.

Fresh orders will be issued after the capture of EVERLEY when the Brigade comes under the orders of the 6th Inf. Bde.

3. Take down the following details regarding your batteries. (See tabular statement below.)

4. Registration may begin without delay.

5. (i) A.R.P. Point X (not on map).

(ii) Batteries will not expend more than 150 rounds per gun without reference to me.

6. Main Dressing Station Point Y (not on map). Advanced Dressing Station near M.S. (Sq. 41).

7. Brigade Report Centre near crosstracks 5211 moving on capture of POND SPUR to neighbourhood of 6th Inf. Bde. Report Centre on COOME DOWN.

37th Battery will place one L.G. near enough to provide the Bde. Report Centre with anti-aircraft protection.

8. Divisional Main artery SIDBURY CAMP-DITCH-ALMA CLUMP. Communication visual until Report Centre moves to COOMBE DOWN when a wire will be laid from 37th Battery to COOMBE DOWN and to 40th Battery.

Any questions?

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Tabular Statement referred to in Para. 3 of above verbal orders.

Battery.	Location.	O.P.	Zone of Fire.	Zone of Observation.	Air Call Zone.	Tasks.	Ammunition.	
37th	In upper part of valley where HAXTON DOWN is written.	Not to be above 190 contour on SIDBURY HILL.	HILL 160 (Sqs. 54-64) to SCHOOL PLANTATION.	VALLEY 54 to HOTEL.	LL Calls only between N. & S. lines through 5020 and 4020.	a. Target B1. From 610382 to 580382. 1200-1205 hours. b. 1215-1220 hrs. E. S. & W. frontages of HOTEL. c. Target B2 as for b. Time to be notified later. d. At other times as D.C.L.I. desires.	2 rds., p.g.p.m. 50% S. 50% H.E. (irregular rate.) S. 6rds., p.g.p.m. ditto (bursts of GF.)	Affiliated to 1st D.C.L.I.
38th	About 3906	WEATHER HILL.	LOWER HOUSE CLUMP to HILL 170 (Sq. 24).	HOTEL and POND SPUR.	ditto.	a. Target B1. 1200-1205 hrs. From 580382 to 574390. b. 1215-1220 hrs. LOWER HOUSE CLUMP to ALMA CLUMP. c. Target B2. Time to be notified later. SCHOOL PLANTATION.	as for 37th Battery.	On capture of EVERLEY and on receipt of orders from Brigade, Battery to move to OLD CHALK PIT, Sq. 32, and come under orders of O.C., K.O.Y.L.I.
39th	Near BEACH'S BARN.	COOMBE DOWN.	Target B1 to CHISENBURY WARREN.	1st Phase. (Attack on POND SPUR). N. point of WEATHER HILL FIRS to WINDMILL COTTAGES SPUR. 2nd Phase. (attack on EVERLEY). WINDMILL COTTAGES to HILL 170.	LL calls only W. of N. & S. lines through 4020.	a. Target B1. 1200-1205 hrs. From 574390 to 567396. b. 1210-1218 hrs. on POND SPUR. c. Target B2. Time to be notified later. WINDMILL COTTAGES and hedges N.W. of them. d. To watch left of K.O.Y.L.I. attack. Towards HILL 170 and LOWER EVERLEY. e. To engage targets as desired by K.O.Y.L.I.	as for 37th Battery. 4 rds. p.g.p.m. 6 rds. p.g.p.m. Shrap. in bursts GF.	Affiliated to 2nd K.O.Y.L.I.
40th (4·5″)	Near HAXTON O	LONG-STREET DOWN.	LOWER HOUSE FARM to HILL 170.	POND SPUR to WINDMILL COTTAGE SPUR.	LL calls only W. of N. & S. line through 5020.	a. 1200-1202 hrs. WEATHER HILL FIRS. b. 1215-1220 hrs. LOWER HOUSE FARM. c. Target B2. Time to be notified later. RECTORY and for 400 yards along road towards HOTEL.	6 rds. p.g.p.m. ditto. 4 rds. p.g.p.m. in bursts of GF.	Observing from SIDBURY CAMP.

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II. DEFENCE.

SITUATION.

The River Bourne is an unfordable river the size of the River Thames at Maidenhead. It forms the frontier between Eastland and Westland. The northern edge of the map is the frontier of a neutral state whose territory it is to the interest of both sides to respect.

EASTLAND has succeeded in seizing the crossings of the R. BOURNE at COLLINGBOURNE KINGSTON and COLLINGBOURNE DUCIS. All other crossings shown on the map are ferries. EASTLAND is about to occupy a bridgehead with two Divisions running from the frontier at EASTON CLUMP (Sq. 59) through EVERLEY and SIDBURY CAMP. One Cavalry Brigade is in contact with the enemy 10 miles to the west at 1700 hours 3rd July and is retiring slowly before them.

The 6th Infantry Brigade sector extends from CHURCH HILL PLANTATION on the right to WEATHER HILL on the left both inclusive. The line on which the enemy is to be stopped runs from the west corner of CHURCH HILL PLANTATION through POND (3630) to COPSE (3824) and thence almost due south.

By 1700 hours Lt.-Col. Gunner (O.C. 10th Field Bde. R.A.) has finished riding round his sector with Col. Smith (6th Inf. Bde.) to whom he is affiliated, together with the brigade machine gun officer, and is standing on WEATHER HILL. His battery commanders are awaiting him in the DITCH just east of the hill and his brigade is concealed from the air as far as possible in and about COLLINGBOURNE DUCIS. Lt.-Col. Gunner has explained that the C.R.A. has instructed him to study the artillery support of the 6th Brigade sector, to decide in concert with Col. Smith on the form it should take, to consult with the C.R.A. who will then co-ordinate the artillery plans of the adjacent sectors and decide how to apply the fire of the batteries retained under his own control.

Col. Smith's proposal is to base his defence on M.G. belts of fire sweeping down the bottoms of the valleys, the artillery commanding the crests and further slopes. The valleys concerned are named as under :

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Description.	Named.	M.G's for its defence.
From S.E. corner of Sq. 35 to S.W. corner of Sq. 34	CHURCH HILL VALLEY	Two guns about 3852.
From N.E. portion of Sq. 15 to LOWER EVERLEY	JUMBLE DIP ...	Four guns W.N.W. of WINDMILL COTTAGES.
EVERLEY to S.W. corner of Sq. 33	WINDMILL ...	Two guns on road near M.S.
From W. corner of WEATHER HILL FIRS to S.W. corner of Sq. 32	COPSE HOLLOW	Two guns in N.E. corner of Sq. 32.
Between OLD CHALK PITS in Sqs. 22 and 32	CHALK PIT BOTTOM	Four guns on W. slopes of WEATHER HILL.

Two guns are to be in the dip by the figures 155 just west of WEATHER HILL to sweep the slopes of the field firing ranges in Sq. 20.

Lt.-Col. Gunner having given his assurance that he can co-operate with the M.G's so disposed, the proposed scheme is adopted as the M.G. defence of the two tactical localities of EVERLEY (including UPPER EVERLEY and the surrounding plantations) and WEATHER HILL to the defence of which Col. Smith is allotting two battalions, (1st D.C.L.I. on the right, 2nd K.O.Y.L.I. on the left). The M.G's of the reserve battalions are being disposed to add depth to this defence and to fire on the east faces of the two localities and on the interval between them. Of the reserve battalions 3rd K.O.S.B. will be in fire positions about HILL 160 (Sq. 54) and 4th S.W.B. about HILL 145 (Sq. 62) and SNAIL DOWN, prepared also to counter-attack the localities in their front if lost. The forward elements of the forward battalions will be roughly speaking between the 160 and 150 contours in the EVERLEY sub-sector and between the 140 and 130 contours in the WEATHER HILL sub-sector.

Col. Smith asks Lt.-Col. Gunner for his artillery plan including recommendations for the employment of the 21st Pack Battery which is under Col. Smith's command.

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It must be noted that Col. Smith would in practice indicate important areas on which he is relying for artillery fire including the minimum volume of fire he expects. For instructional purposes it is desirable that artillery officers in studying this problem should deduce these danger points for themselves.

It should also be remarked that the procedure of the C.R.A. must of necessity be the opposite in the defence to what it is in the attack. In the attack the Divisional Commander, having the initiative, was able to decide in advance where his major divisional artillery concentration could best help his plan of attack, and the minor brigade concentrations and fire tasks were fitted in as appendages to the main plan. In the defence on the other hand the initiative has been surrendered and the actions of the enemy govern the situation. The position of the troops on the ground depends on the M.G. plan amplified by the accompanying artillery fire. Close examination of local conditions in the immediate front of each sector by artillery commanders working in concert with the infantry is the first step, while the C.R.A. concerns himself with the study of the factors affecting the more distant areas in front of the position, distant lines of approach, hostile gun positions, etc. The C.R.A. is compelled to accept the near artillery targets selected by brigades because the M.G. framework is their basis. Making a selection of the most important and treating the target covered by the brigade as a nucleus, the C.R.A. adds the fire of batteries in his own hand or of those of neighbouring sectors in an emergency and so builds up his major artillery concentrations. In attack he decides first such concentrations and his subordinates fill out his plan. In defence the subordinate commanders decide their local plans and the C.R.A. welds them into one.

Lt.-Col. Gunner sums up the impressions he has received during the reconnaissance with Col. Smith in the following manner:—

I need not concern myself with distant approaches nor with counter battery work which the C.R.A. is arranging. My objects are:—

(i) To make the enemy deploy as far away as possible and cause him as heavy losses as possible during his advance up to M.G. range.

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(ii) To put fire onto possible positions of assembly within our immediate front.
(iii) To help the infantry and M.G's to crush assaults.
(iv) To support any counter attacks our reserve battalions may have to carry out.

Important though ground always is, in this case it seems to demand unusually close attention.

No artillery observation is possible from within the position except along the EVERLEY—WEATHER HILL ridge. Uninterrupted observation from this ridge is a matter of great importance to the Division. The view obtainable from the ridge is nevertheless for the most part restricted. On the right from north of EVERLEY one can see as far as the spur in west portion of Sq. 26 (called 200 spur) and its continuation to the DEVIZES—ANDOVER road. Further south observation is restricted by HILL 170 (Sq. 24) and LONGSTREET DOWN until WEATHER HILL gives a view across the southern portion of LONGSTREET DOWN onto a portion of LITTLECOTT DOWN and onto CENTRAL FLYING SCHOOL RIDGE towards the N.W., and in a W.S.W. direction commands the road from FITTLETON as far as the neighbourhood of MILE BALL.

It follows that for the most part the enemy will have to come right forward of the ridge 1000 yds. from our infantry positions to get observed fire onto our forward posts. The exception is opposite EVERLEY where 22 SPUR gives the enemy a better view into our position than elsewhere. Moreover HILL 170 (Sq. 24) is the nearest point of the enemy's ridge to our lines and just behind it CHISENBURY WARREN and JENNERS FIRS afford cover from the air (some of the tree tops are probably just visible from SIDBURY HILL), in a good position of assembly with a covered line of approach via RAINBOW BOTTOM covered from view even from SIDBURY HILL. Here is an area requiring particular attention by the defence.

The next most favourable forming up position is just west of LONGSTREET DOWN also approached by RAINBOW BOTTOM. Least favourable but still feasible would be an attack directed between COOMBE HILL and HILL 140 (Sqs. 10 and 20).

Examining the M.G. belts in detail it is seen that :—

(a) W. and N. of LOWER EVERLEY is covered from our M.G. fire.

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(b) There must be a bit of valley bottom dead to all M.G. fire between the dew pond at 2938 and the 135 contour, i.e. about 400 yds.

(c) The bottom of the valley south of the WINDPUMP in Sq. 31 to HAXTON O in the neighbouring sector will similarly be dead to our machine guns.

Likewise (d) The BAKE BARN hollow.

(e) The hollow just above the word "DOWN" of COOMBE DOWN.

(f) West of BEACH'S BARN and BEACH'S BARN WARREN.

These areas together with the possible enemy forming up places form the most important of the near artillery targets. Tanks I will deal with separately.

The steepest angle of descent of all these targets is (b), the valley bottom south of the dew pond. If I site my 18 prs. to drop their shell onto that area, the other targets will also be able to be brought under their fire. The slope of the east side of the valley at the DEW POND measures out to 4° 50′ which is the angle of descent of 18 prs. firing full charge at 2350. I must therefore site my 18 pr. batteries not less than 2500 yards away from the DEW POND. Guns that can hit the DEW POND will have no difficulty in sweeping the slopes east of CHISENBURY WARREN.

The problem of anti-tank defence presents some difficulties. EVERLEY with its plantations, LOWER HOUSE FARM and the CLUMPS just west of it and WEATHER HILL FIRS are the only tank-proof localities in the sector. Tank attacks may be expected to penetrate between them and the intervals should therefore be under fire at about 1000 yds. range. On the other hand our forward infantry are in the open and badly exposed to tanks. Guns far enough forward to engage tanks before they reach our infantry would be impossible to conceal except (a) near WINDWARD BALL PLANTATION whence they can fire at 1500-2000 on the 170 ridge as far south as BADEN'S CLUMP, and (b) in the N.W. end of WEATHER HILL FIRS firing towards COOMBE DOWN and BEACH'S BARN. Favourable positions also exist on the flanks of EVERLEY and WEATHER HILL, defiladed from the enemy, from which to engage at short range tanks moving round those localities. I must make use of all these for our anti-tank defence.

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Finally where shall I establish my Report Centre? Col. Smith is having his camouflaged in the open about the Tumuli at 6428 with an advanced centre somewhere up on EVERLEY DOWN. I will have mine near Col. Smith's and will similarly establish an advanced O.P., digging it in, turfing over and camouflaging if required with netting which, I note, is available in considerable quantities.

My Plan accordingly is as follows:—

(A) One 18 pr. battery affiliated to D.C.L.I. located about HILL 160 (Sq. 54) where it can shoot over open sights up to the east edge of the EVERLEY locality and to the S.W. as far as SPUR 160.3 (upper part of POND SPUR). Zone of fire—Tumuli (2463) to S.W. corner of Sq. 23. Zone of observation—Head of JUMBLE DIP to HILL 170. One gun of this battery to be dug in near 4052 for anti-tank defence—zone of fire HILL 170 to BADEN'S CLUMP. Battery O.P's near RECTORY, alternative dug in in open in N.W. corner of Sq. 44 with gap in trees near MARLBOROUGH ROAD COTTAGES to allow visual communication with battery.

Targets see below.

(B) One 18 pr. battery affiliated to K.O.Y.L.I. located near HILL 145 (Sq. 62) where it can shoot over open sights up to SNAIL CLUMP SPUR on the right and the neck between WEATHER HILL and SIDBURY HILL on the left. O.P.—S.W. slope of WEATHER HILL; alternative N. slope of WEATHER HILL.

Zone of fire—CHISENBURY WARREN to FIELD FIRING RANGES (Sq. 20).

Zone of observation—south end of LONGSTREET DOWN to HILL 143 (Sq. 10).

One gun of this battery to be dug in near 4328 for anti-tank defence: zone of fire—160 contour N.W. of BAKE BARN to as far south of BEACH'S BARN as possible.

(C) One 18 pr. battery located just N.W. of HAZLEBERRY PLANTATION able to support counter attacks if required on either EVERLEY locality or WEATHER HILL. O.P. between UPPER EVERLEY and WEATHER HILL FIRS.

Zone of fire—LOWER EVERLEY to HILL 143.3 (Sq. 10).

Zone of observation—HILL 170 to COOMBE HILL.

(D) 4·5″ howitzer battery located in the LOWER HOUSE FARM—ALMA CLUMP area. O.P. on WINDMILL COTTAGE SPUR and alternatively on 160.3 Spur.

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Zone of fire—JUMBLE DIP to HILL 143·3.
Zone of observation—JUMBLE DIP to BADEN'S CLUMP.

(E) One section 3·7″ howitzers for internal defence of EVERLEY locality.

TARGETS.

J 1 a.	N.W. edge of LOWER EVERLEY ...	Two 18 pr. batteries.
b.	S.E. ditto ...	Two 18 pr. batteries.
	Buildings of ditto ...	4·5″ battery.
J 2.	JENNERS FIRS, CHISENBURY WARREN and valley bottom just east of them	All.
J 3.	Crest of HILL 170	All.
J 4 a.	Valley bottom from dew pond 2938 southwards for 400 yards	Two 18 pr. batteries.
J 4 b.	ditto	All.
J 5.	Reverse slope of LONGSTREET DOWN	All.
J 6.	Crest of LONGSTREET DOWN	All.
J 7.	BAKE BARN HOLLOW	One 18 pr. battery. 4·5″ battery.
J 8.	BEACH'S BARN and WARREN	Two 18 pr. batteries. 4·5″ battery.
J 9.	East of HILL 143.3	ditto.

ANTI-TANK PLAN.

(a) One 18 pr. at head of CHURCH HILL VALLEY.
(b) One 18 pr. WEATHER HILL FIRS.
(c) One 18 pr. battery able to engage tanks advancing round flanks of EVERLEY.
(d) One 18 pr. battery able to engage tanks advancing round flanks of WEATHER HILL.
(e) One 3·7″ howitzer on west edge of CHURCH HILL PLANTATION.
(f) One 3·7″ howitzer on west edge of SCHOOL PLANTATION.
(g) Two 3·7″ howitzers to be dug in at spots to be selected on forward slopes of WEATHER HILL.

Lt.-Col. Gunner having obtained the approval of the O.C. 6th Inf. Bde. to this plan, now joins the C.R.A., with whom he finds the O.C the neighbouring affiliated brigade, and explains his proposals. After examination the C.R.A. decides to propose to the Divisional Commander that certain of the unaffiliated batteries which are under the C.R.A's direct control should add depth and breadth to the following of the above targets :—J 1 a and b, J 2, J 3,

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J 5 and 6, J 9. Co-ordination is also required between the plans of the 10th Field Bde. and the neighbouring brigade to the south as regards targets on HILL 143.3

Respecting LOWER EVERLEY the C.R.A. arranges with 1st Division (whose troops continue the line north of EVERLEY) for co-ordination of the action of their respective artilleries should a heavy hostile attack develop in that direction.

Lt.-Col. Gunner cannot afford such a long delay before ordering his batteries into action as would ensue if he waited until after his interview with the C.R.A. As soon as his reconnaissance is finished and his plan formed and approved by Col. Smith, he proceeds therefore to the rendezvous he has fixed for his battery commanders and issues all his orders except his list and allotment of targets.

He issues his orders in the following manner :—

Features are being named as under :—

(The valleys as named by the Inf. Bde. Commander.)
WINDWARD CREST, in N.W. corner of Sq. 44.
WINDMILL SPUR.
POND SPUR.
BAKE BARN HOLLOW.
DOWN HOLLOW, where word "DOWN" of COOMBE DOWN is written.
PAINTERS COPSE, Sq. 32.
HILL 143.

1. (a) The enemy strength unknown was pressing our cavalry back about 10 miles to the west at 0830 hours this morning. We may expect an attack as soon as the enemy can deliver it.

(b) The Force is taking up a position to cover the captured crossings on the general line EASTON CLUMP—EVERLEY—SIDBURY CAMP to a point on the River BOURNE 2500 yds. S.E. of SIDBURY CAMP. 1st Division on the right, 2nd Division on the left. Dividing line between divisions LOWER PLANTATION (Sq. 74)—HILL 160—LOWER EVERLEY all inclusive to 2nd Division. 2nd Division has 6th Inf. Bde. on the right, 5th Inf. Bde. on the left. 10th Field Bde. R.A. is affiliated to the 6th Inf. Bde. The 21st Pack Battery is under the orders of the 6th Inf. Bde. for close support. Dividing line between brigade sectors, location of our infantry and M.G's together with their belts of fire are marked on this map. Please copy it onto your own.

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2. The 10th Field Brigade will co-operate in the defence of the sector :—

(i) By predicted fire on certain selected targets.
(ii) By observed fire as required.
(iii) By engaging hostile tanks with direct fire.
(iv) By co-operating in any counter attacks that may prove necessary.

3. Method of execution.

Take down the following details regarding your batteries :—

Remarks.

37th. (a) Battery affiliated to D.C.L.I.
(b) One gun to be dug in for anti-tank defence near 4052.
(c) Battery to be located so that direct fire can be employed up to east edge of EVERLEY locality and to S.W. as far as SPUR 160.3

38th. (a) Battery affiliated to K.O.Y.L.I.
(b) One gun to be dug in for anti-tank defence near 4328. Zone of fire 160 contour N.W. of BAKE BARN to as far south of BEACH'S BARN as possible.
(c) Battery to be located so that direct fire can be employed up to SNAIL CLUMP SPUR on the right, and neck between WEATHER HILL and SIDBURY HILL on the left.

39th. To be prepared to support counter-attack on either EVERLEY locality or WEATHER HILL.

40th (4·5″). Nil.

List and allotment of targets will be issued later.

4. 76 rounds per gun and 48 rounds per howitzer will be dumped in battery positions.

A.R.P. MOUNT ORLEANS FARM.

5. Main and Advanced Dressing Stations will be notified later.

6. Animals in wagon lines may be unharnessed until further notice.

7. Divisional main artery will be notified later. Cable communication will be laid between Brigade and all Battery Headquarters. Brigade Report Centre will be about 6428 with an advanced centre at a point yet to be selected on EVERLEY DOWN.

8. Survey information will be issued shortly.

Any questions?

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Southcott
Manor House
Southcott House
Windpump
Mill's Farm
Swan G.P.
Southcott Field Barn
Fyfield Field Barn
Fyfield Down
Milton Hill
Milton Hill Clump
Tumulus
Hill Barn
Goldenlands Farm
Southgrove Copse
Pheasantry
Chalk Pit
Southgrove Farm
New Barn
Grafton Fields
Grafton Down
Grafton Clump
Folly Barn
Johnson's Barn
Pawsey Hill Farm
Earthworks
Winter's Penning
Pawsey Down
Bourne Pennes
Down Farm
Old Chalk Pits
Milton Hill Farm
Milton Wood
Everley Ashes
Tumuli
Crowborn Clump
Crow Down
Faletons Pond
Marlborough 9 Salisbury 18
Aughton Down
Earthwork
Inham Down
Marlborough 9 Andover 12
Aughton Farm
Aughton
Wagland's Farm
Brunton
Brunton Farm
Hill Barn
Tinker's Barn
New Buildings
Fairmile Down
Hog Down
Linden Copse
Infirmary Copse
Croft Barn
Chalk Pit
Manor Farm
Collingbourne Kingston
Thornhill Down
Summer Down
Hake Down
Windmill Plantation
Marlborough 10 Andover 11
Cowdown Plantation
Round Down
Wren Copse
Windward Ball Plantation
Marlborough Road Plantation
Central Flying School Ridge
Devizes 12 Andover 14
Lower Everley
Lower Everley Farm
Church Hill Plantation
Marlborough Road Cottages
Marlborough 11 Salisbury 16
Sunton
Sunton Farm
Cawdrey's Farm
Lower Plantation
Lynden Down
Lynden Barn
Jenner's Firs
Chisenbury Warren
Home Farm
Manor House
Coombe Cottages
Everley
Rectory
Devizes 14 Andover 12
Collingbourne Ducis
Court Farm
School
Mill Lane
Marlborough 11 Andover 10
Hungerford 11 Salisbury 16
Mount Orleans Farm
Upper Everley
Windmill Cottages
School Plantation
Hotel
Lodges
Gore Down
Oldland Barn
West Hill
Hazelberry Plantation
Little Cott Down
Tumulus
Lidbury Camp
Chisenbury Field Barn
Lower House Farm
Alms Clump
Lower House Clump
Chalk Pit
Devizes 15 Andover 11
Badens Clump
Evelick Down
Snail Clump
Marlborough 12 Salisbury 15
Longstreet Down
Old Chalk Pit
Weather Hill
Snaildown Square
Ditch
Snail Down
Tumuli
Devizes 16 Andover 10
Hougoumont Farm
Glebe Barn
Knoll Plantation
Ditch
Rainbow Bottom
Bodan Barn
Drewsett's Barn
Twin Barrows (Tumuli)
Drewsett's Clump
Coombe Down
Coombe Hill
Bake Barn
Chalk Pit Clump
Coombe Field Barn
Beach's Barn
Beach's Barn Warren
Marlborough 13 Salisbury 14
Haxton Down
Haxton O
Field Firing Ranges
Vanishing Pits
Haxton Field Barn
Sidbury Camp
Old Gravel Pit
Sidbury Hill
Sidbury Hill Plantation
Rifle Ranges
Targets
Camping Ground
The Pennings
Cemetery
Leckford Bridge
Coldharbour's Copse
Marlborough 12 Andover 9
Hungerford 12 Salisbury 15
Cuckoo Pen
Cowdown Barn
Sunnyhill Copse
Sunnyhill Down
Barrow Plantation
Cow Down
Southby Bridge
Leckford Bottom
Wiggerly Down
Windmillhill Down
Windmillhill Plantation
Tidworth Down Farm
Devizes 18 Andover 8
Helge end Plantation
Knoll Plantation
Pickpit Hill
Ditch
Mile Rail
To Andover 8 Miles
To Marlborough 7 Miles
Marlborough 7 Andover 14
Marlborough 8 Andover 13
Devizes 13 Andover 13
Marlborough 11 Andover 11
Marlborough 10 Andover 11
Devizes 17 Andover 9
Devizes 18 Andover 8
Marlborough 13 Salisbury 14
Devizes 14 Andover 12
Devizes 15 Andover 11
Marlborough 12 Salisbury 15
Marlborough 9 Salisbury 18
Marlborough 9 Andover 12
Marlborough 10 Andover 11
Marlborough 11 Andover 10
Marlborough 12 Andover 9
Hungerford 12 Salisbury 15
Devizes 18 Andover 8
Devizes 17 Andover 9
Devizes 16 Andover 10
Devizes 15 Andover 11
Devizes 14 Andover 12
Devizes 13 Andover 13
Devizes 12 Andover 14
Marlborough 8 Andover 13
Marlborough 7 Andover 14
SOUTH WESTERN JUNCTION RAILWAY
LONDON & SOUTH WESTERN RAILWAY
Chicksgrove Bottom
Wick Down
Cow Down
Lidbury Down
Ditch
Ford
Well
Spring
Water Supply
Chalk Pit
Gravel Pit
Vanishing Pits
Target
Rifle Range
Camping Ground
Cemetery
Station
Goods Yard
Level Crossing
Tumulus
Tumuli
Earthwork
Earthworks
Windpump
Milking Bushes
Hogdown Copse
Wren Copse
Windward Ball Plantation
Marlborough Road Plantation
Pheasantry
Church Hill Plantation
Lodges
Hotel
Infirmary Copse
Linden Copse
Croft Barn
Manor Farm
Thornhill Down
Summer Down
Hake Down
Windmill Plantation
Cowdown Plantation
Round Down
Lower Everley
Lower Everley Farm
Jenner's Firs
Chisenbury Warren
Chisenbury Field Barn
Lidbury Camp
Badens Clump
Alms Clump
Lower House Clump
Lower House Farm
Chalk Pit
Snail Clump
Snaildown Square
Ditch
Snail Down
Weather Hill
Old Chalk Pit
Twin Barrows (Tumuli)
Drewsett's Barn
Drewsett's Clump
Coombe Down
Coombe Hill
Bake Barn
Chalk Pit Clump
Coombe Field Barn
Beach's Barn
Beach's Barn Warren
Haxton Down
Haxton O
Field Firing Ranges
Vanishing Pits
Haxton Field Barn
Sidbury Camp
Old Gravel Pit
Sidbury Hill
Sidbury Hill Plantation
Rifle Ranges
Targets
Camping Ground
The Pennings
Cemetery
Leckford Bridge
Coldharbour's Copse

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THE STAFF OFFICER IN THE AIR.

A Reply to "ARTILLERY COMMAND FROM THE AIR."

By Lieut.-Colonel F. A. Pile, D.S.O., M.C., Royal Tank Corps.

THE proposition advanced by Colonel Rowan-Robinson in the January number of the Royal Artillery Journal is a most attractive one. Nothing could be more ideal than that wherever support is required it should be forthcoming without delay. This instantaneous support is even more forcibly attractive to the Royal Tank Corps than to the Infantry. An infantry attack that comes under heavy fire from a nest of machine guns will be unable to progress. But the attacking infantry can lie down and so minimise their casualties, while a tank, which suddenly comes under the fire of anti-tank guns, has little hope of finding cover—its safety, then, lies in its mobility or in a smoke screen.

After a little practice a C.R.A. should be able to observe accurately from the air. The first time a man flies he is in a continual state of bewilderment. A map may be an exact representation of the earth but, at first sight from the air, it is hard to find any relation between the two. As soon as a land-mark is identified the machine flies into a cloud and when it comes out it is probably flying at right angles to its original line, and the land-mark looks quite different. But this stage soon passes and then accurate observation of troops presents little difficulty, particularly to a man who has had the ground experience of a C.R.A.

The Royal Air Force argue that in a two-seater machine the observer is very much mis-named. He is not the observer but the gunner—the defender of both the pilot and himself. It is the pilot who observes. It is far easier for the pilot to carry out this rôle, for he can guide the machine where he wills, while the observer must go where he is taken, and though he can direct in a general sort of way, he is apt to be swept round out of view just at the moment when he is most anxious to see a particular part of the

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battle. A three-seater machine is now being experimented with. This has one supreme disadvantage. It is cumbersome and therefore vulnerable. The Royal Air Force, therefore, consider that the most efficient results will be obtained by flying a two-seater machine and making the pilot responsible for observation.

There is a very great difference between the mental picture of the front before and after it has been viewed from an aeroplane. It is all to the good that not only C.R.A's but other commanding officers should fly over their respective areas so that this mental picture can be obtained. If these flights are to be of value the officers who make them must have had some training in observation. The real point is where would the C.R.A. be most effective? Would the best results be obtained by putting him in an aeroplane or on the ground? The C.R.A. has two duties. He advises the divisional commander and he commands the artillery of the division. The advice he can give to a divisional commander from the air might, possibly, be more accurate but it certainly will not contain such moral support as that given in a personal interview.

Some divisional commanders rely very greatly on their gunner. The C.R.A's staff do not carry the same weight. Other divisional commanders, and by no means necessarily the most successful, are content to let the C.R.A. perform the second of his duties and do not require his moral support. It is true that a C.R.A. can easily be called down from the air to a conference, but that is not the same thing as having the C.R.A. in the next room all the time. The actual physical command by the C.R.A. can be carried out far more easily from the ground. The observer's seat in an aeroplane is a very draughty place. The C.R.A. will require a map covering the area occupied by his own batteries and also the objectives. There is no room for a map board, and the handling of a large map in a wind is difficult. In theory he may carry the positions and arcs of fire of his batteries in his mind, but if he wants to put a brigade on to any particular target he must be certain that he is not using a brigade that is already employed on a vital task, and that the brigade selected can hit the target. That is he must consult his map. If he is only going to play with the one superimposed brigade it is quite possible that he can carry an accurate mental picture of this brigade. But he is then imposing unnecessary limita-

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tions on his power of re-adjusting the artillery support. It will be seen, then, that the mechanism of command from the air is less easy and, therefore, probably less efficient than from the ground.

Efficient artillery support depends on various factors, the principal one being intimate co-operation between the infantry, or tanks, and the supporting artillery. This intimate co-operation implies :—

(1) An accurate knowledge by the artillery of the position of the infantry, and the difficulties that, from time to time, confront them, and

(2) A knowledge by the infantry of the plan by which the artillery intend to help them overcome those difficulties.

Up to date the exact position of the infantry has been obtained through infantry brigade commanders and through reports from F.O.O's. The information obtained from the latter source was, as a rule, the more accurate. This was because the F.O.O. had better means of communication with the rear. Close reconnaissance aeroplanes were also helpful. But the pilots of these machines could only call for, and report, the position of flares they had seen. Very often it was impossible for the foremost infantry to light flares.

There is another difficulty. An aeroplane pilot is first of all an officer of the R.A.F. He is not, and is never likely to be, an expert in what is happening on the ground. To get the best value from close reconnaissance the pilot should have an intimate knowledge of what the plan is—where each body of troops might be expected to be—and what is the significance of each manœuvre taking place. Were there an extra staff officer at divisional headquarters—an officer really *au fait* with the situation and who was well versed in the intricacies of observation from the air—it should be possible to obtain information very rapidly. His business would be to watch the whole division front and to report wherever the attack was not going according to plan.

Given accurate knowledge of the situation it is not difficult to make a plan. But this plan can only be effective if the co-operation of all arms is assured. The infantry must be consulted. It is no use turning a lot of guns on to a place unless the infantry are prepared to go in the moment the fire is lifted. When a company of

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infantry is held up it means, as a rule, that company has suffered serious casualties and may not be in a position to continue the attack. The plan, then, can only be made if the C.R.A. and the commander he is supporting know the situation as it actually exists on the ground, and not as it may appear to exist from the air. It has already been stated that the support of tanks needs greater rapidity than the support of infantry. If this support is to be forthcoming a special allotment of artillery and close reconnaissance aeroplanes must be made. The French invariably so allot. It would not, however, appear necessary that the artillery brigade commander or other senior officer supporting the tanks, should fly. It would be preferable that the observer in the machine should be an officer of the Royal Tank Corps. He, as in the case of the staff officer mentioned above, would be more completely in sympathy with what the tanks are attempting and he would know that the safety of the tanks depended on rapidity. A cut and dried scheme for smoking the hostile weapon for three or four minutes could be arranged. All tank commanders would then know that when they came under heavy hostile fire they might expect assistance in the shape of a smoke screen which would last, say, three minutes. The artillery brigade commander could not obtain this fire any more quickly were he observing from the air; while, on the ground, he would be far better able to control his batteries.

It would appear, then, that while we do want to make more use of the air for helping the tanks and infantry forward, the position of the commanders should, as a general rule, be at their headquarters, and that staff officers should carry out the task of keeping them informed of the situation as it appears from the air.

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A MARCHING PROBLEM.

By Lieut. G. L. Appleton, R.A.

The combination of horse, foot and mechanical transport in the column of route.

THE fighting vehicles of the Division are horsed, but combatant units of army troops, such as mechanicalized medium and field artillery, tanks and armoured cars, may at any time be allotted to fight and march with divisional troops. The time may come when all fighting troops are carried by mechanical means, but in the interim the problem of harmonizing the marching powers of horse, foot, dragon, tank, lorry and armoured car must be faced. The economical gait of the commercial lorry is about 15 miles an hour. It is to this vehicle that we look for expansion on mobilisation. We cannot therefore assume the future provision of a specialized lorry to move economically at 2½ miles an hour. In the case of purely military vehicles such as the dragon or tank, the provision of a wide range of speeds maintainable without injury and with reasonable economy may be technically possible, but speaking generally the economical and normal gait of internal combustion transport, as a class, is considerably in excess of that of marching infantry or horses at a walk. The employment of the newly mechanicalized Divisional Train and B Echelon Divisional Ammunition Column need not be considered, as their duties allow of them being well to the rear and of approaching the fighting troops independently of them and at their own normay speed.

It is the fighting mechanical transport, such as artillery, tanks, Royal Engineer bridging vehicles, armoured cars and the like which presents the problem. Assuming that it cannot march at 2½ miles an hour its inclusion in the column of route is not feasible. It is thus compelled to move either in front of or behind the column and to move by "bounds." With the possible exception of tanks, fighting mechanical transport under present conditions must have infantry or cavalry in front of it. Its movement will then take the form of a "bound" until the rear of the marching column is caught

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up, followed by a halt until the maximum distance of the "bound" is once more attained. The disadvantage of having the mechanical arms distant in rear from the remainder of the column by perhaps the maximum "bound" is not as great as perhaps at first appears. To take a simple example: a brigade group in a single column consisting of infantry, horsed R.A., R.E. and R.A.M.C., would form a column of about $3\frac{1}{2}$ miles in length, of which the infantry alone would take about 2 miles. The deployment of such a force would certainly not be effected in much under 45 minutes. Now if it be assumed that the fighting mechanical transport was moving in "bounds" of ten miles at a time, and that when required it was at the maximum distance of ten miles, it may be taken that it would reach the area of deployment in not much more than an hour, that is almost as soon as the infantry dispositions were complete. Parties carried by swift cars or motor cycles could carry out the necessary reconnaissance in advance and organize communications and observation posts. In practice the mechanically borne arms would be kept at a maximum distance of not more than from three to five miles when contact with the enemy was anticipated. The delay in coming into action would be proportionately less.

In cases where more than one road is allotted to a division the situation is improved, as the broader the front on which the division advances the nearer to the heads of the columns will the fighting mechanical transport be. The use of a parallel road solely allotted to mechanical transport might in certain circumstances be envisaged. Not only would the movements of fighting mechanical units be facilitated but supply and ammunition vehicles could work to the vicinity of heads of columns on the march while making but small use of roads in use by marching troops. The protection of such a route and the provision of signal communications for liaison and control would render this solution difficult in practice, while it would be rare to find adequate roads running parallel within suitable distances of each other. As a general rule, the normal arrangement of the mechanical transport in rear must be anticipated. In the case of advanced guards, vehicles such as tanks and tractor-drawn artillery will find their place between the advanced guard and the main body, and will "shunt," so to speak, between the tail of one and the head of the other. The present policy is that

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tanks are expected to deal with centres of resistance only after they have been located by other arms. Ample time will usually be available to call up advanced guard tanks which will be seldom more than twenty minutes' march distant. The distance between the advanced guard and the main body tends to increase under the influence of the longer range of light artillery. The presence of tanks in this gap will give a measure of security in case of enemy enterprises launched in flank and in rear of the advanced guard, and especially in case of raids by small machine gun detachments which may have been passed over unawares by the advanced guard.

The speedy intervention of the mechanically-borne arms presupposes clear roads between what may be called the "M.T. Column" and the marching troops. However desirable it might be to keep the roads thus literally clear it would appear to be impracticable to do more than ensure a non-stop run for the "M.T. Column" when it was called upon to make a bound in order to take part in battle. Careful traffic control would be necessary to attain this, combined with wide powers to the traffic police of "clearing the road" when an urgent rapid "bound" of the M.T. Column was in progress.

The inclusion of mechanical transport in the division in column of route causes a considerable and disproportionate increase in the effective length of the column. As at present constituted the Infantry Division exclusive of motor transport forms a single column of something over 14 miles in length. Another $4\frac{3}{4}$ miles must be added for the first line mechanical transport though the occasions on which the latter appears simultaneously and complete in a single column will be very rare. If another 10 miles is allowed for the "bound" of the mechanical transport together with such other mechanical units of army troops as may be added the effective maximum length of the divisional column may reach as high a figure as 29 miles. In practice, however, the supply lorries of the Divisional Train will be performing their usual functions and will not form part of the actual column. The mechanical transport of Divisional Signals may also be regarded as largely outside the column. The effective length of the Division on the march may then be taken as somewhere about 27 miles. The general result of the use of mechanical transport within the Division is that the

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division when moving by road will be divided into two great echelons: horse and foot in advance followed by motor transport in rear, at a distance varying from nothing to perhaps 10 miles. Each echelon will contain both fighting troops (when army troops are attached) and administrative troops though fighting troops will naturally predominate in the "horse and foot" echelon and administrative troops in the motor transport.

It will thus be seen that wherever an arm or a service is provided with two modes of transport—horse and mechanical—a greater or less degree of dispersion between the two echelons must be anticipated. This will add to the difficulties of command and co-operation which can only be lessened by an adequate and efficient system of communications, which must function while the division is on the move. Where the division marches in a single column communications can be maintained between the "horse and foot" and the M.T. echelons, as well as with the higher command, aerodromes, railheads, etc., by means of two or more report centres moving by "bounds" on the line of march. Where civil telegraph and telephone lines exist on the route, as in European countries is often the case, these report centres can be linked by land lines. Alternatives to land lines are radio telephony and wireless telegraphy, the latter of which it is the General Staff policy to develop in replacement of cables and air lines in the forward areas. Aircraft would furnish a further means of communication if provided with landing or dropping grounds in the vicinity of report centres, which would also be equipped with short range wireless for communication with aircraft. It is doubtful however, if aeroplanes with the division would be sufficiently numerous to allow of the use of aircraft in this way except in emergency.

Where the division is marching in two or more columns the question of inter-communication, particularly laterally, becomes complicated. It is here that wireless has its special value. The report centres must in each case be provided with an adequate establishment of motor-cyclist despatch riders and runners, without which congestion and delay will occur. It will readily be seen that a high degree of efficiency is demanded from the divisional signals, and an equally high degree of organisation from the divisional staff.

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OUR CANNON AT THE BATTLE OF CRESSY, 1346.

By Lieut.-Colonel H. W. L. Hime, R.A. (Retired).

Our knowledge of the presence of our cannon at the Battle of Cressy, 1346, is derived from five sources:—

(1) The "Istorie Fiorentini" of Giovanni Villani written before 1348[1];
(2) The "Istorie Pistolesi," written about the same time[2];
(3) "Les Grandes Chroniques de St. Denis, selon qu'elles sont conservées en l'église de St. Denis en France"[3];
(4) The "Chronicles of Froissart" (according to his best and fullest MS., discovered in Amiens, 1839, by M. Rigollot), in M. Kervyn de Lettenhove's great edition of Froissart's Works;
(5) The "Abrégè" of the above Chronicles made by Froissart himself[4].

The accuracy of Villani about contemporary events is attested by Tiraboschi, "Storia di Letter. Ital.," V, pt. 2, p. 612; Sismondi, "Hist. d. Repub. Ital.," VI, 23; Ginguené, "Hist. Litt. d'Italie," II, 302; Balzano on Villani in "Encyc. Britt." 9th ed. When speaking of our cannon at Cressy in his "Middle Ages," I, 478, Hallam positively says:—"the testimony of Villani . . . . cannot be rejected."

In his introduction to the "Istoria Pistolesi" Muratori says he believes that in the future it will be as well thought of as Villani's chronicle, "seeing that the author mentions many facts overlooked by Villani and writes his narrative with praiseworthy sincerity." As this history ends abruptly in the year 1348, the author may have been carried off by the plague, like Villani.

[1] "Classici Ital." Milan, 1803; VIII, 173.
[2] Muratori, "Rerum Ital. Scriptores"; XI, 516.
[3] Brit. Museum MS. Cotton, Nero, E.II; pt. 2, fol. 397.
[4] In Lettenhove's "Froissart"; vol. I, pt. 2, p. 149.

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Of the Chronicles of St. Denis M. Molinier says in his "Sources de l'Histoire de France," V, (160) :—dès le XIIe siècle ces chroniques (de St. Denis) jouissent d'un renom tout particulier, et sont maintes fais alléguées, même par de simples jongleurs."

M. Kerwyn de Lettenhove says that the Valenciennes MS. of Froissart (which dates from 1376, and on which our present editions and translations of Froissart are based) "n'est guerre que l'ébauche de la première rédaction"; while the Amiens MS., which dates 1377-79, is "le texte qui forme réelement la première rédaction." Now our cannon are not referred to in the Valenciennes MS., although they are spoken of in both the Amiens MS. and in the "Abrégè." How did this happen? If Froissart was not aware of the presence of our cannon at Cressy when he wrote the Valenciennes MS., no more can be said on the matter. If he was aware, he had an excellent motive for silence. He had been a devoted secretary to Queen Philippa and was of course well known to the King; he was on good terms with the Black Prince, whom he once accompanied from England to Dax; he was in the train of the Duke of Clarence, the King's third son, when he went to Italy to marry the daughter of Galeazzo Visconti. It is true that when writing this MS., which was finished in 1376, the Queen and Clarence were both dead; but Froissart was too much a man of the world to offer a mortal offence to the King and the Black Prince by speaking of the cannon. Nothing could have been more offensive to them than a hint that the victory was not altogether due to themselves, the Knights and the archers. Froissart, therefore, maintained a discreet silence. But whilst the Amiens MS. was being written, 1377-79, the situation changed. The Black Prince died in 1376, the King died in 1377; there was no longer reason to suppress the truth, and Froissart told it plainly in this MS. and in his "Abrégè" of it. Were the four affirmative witnesses—two Italians, a Frenchman and a Fleming—independent? In order to answer this question we must examine their evidence.

VILLANI.

"The (English) guns cast iron balls by means of fire . . . . They made a noise like thunder and caused much loss in men and horses . . . . The Genoise were continually hit by the archers and

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gunners . . . (At the end of the battle) the whole plain was covered by men struck down by arrows and cannon balls" *(pallottoli).*

ISTORIE PISTOLESI

(At the crisis of the battle) "the English Knights, taking with them the Black Prince . . . . and many bombards, advanced to attack the French."

CHRONIQUES DE ST. DENIS.

"The English made use of three cannons" (trois cannons).

FROISSART'S CHRONICLES.

"When the officers had got (the Genoise) into shooting formation, the archers raised a great shout. But the English (kept) quite still and loosed off some cannon they had with them" *(descliquierent aucuns kanons qu'ils avaient en la bataille).*

ABRÉGÈ.

"The English loosed off two or three bombards" *(deux ou trois bombardiaulx).*

A glance at these passages shows that they were written independently. The witnesses agree about the main point, the employment of the English Artillery, and they disagree about details—a sure sign of sound evidence. Having then, before us four good, independent witnesses, we are fully justified in concluding with Muratori that "at the desperate battle of Cressy the English certainly (certamente) made use of bombards which cast iron balls by means of fire." The presence of our guns at Cressy is, in fact, one of the best attested events in the Hundred Years War.

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AN ACT OF INTERNATIONAL FRIENDSHIP. SAN SEBASTIAN, 28th SEPTEMBER, 1924.

By Major-General J. C. Dalton, Colonel Commandant, R.A.

I.

UNDER the title of "Acto solemne de hidalguía Hispano Ingles—The English Cemetery at San Sebastian," the *Memorial de Artilleria* for May, 1925, gives a full account of a pleasing ceremony on the heights of Monte Urgull. The *Memorial* observes "On two occasions in the past century have English troops come to the assistance of Spain, viz., in 1808-14 and in the first Civil war, 1836-38." The only memorial hitherto to the British soldiers who died for Spain on both these occasions was constituted by scattered groups of graves on Monte Urgull, known as the "English Cemetery."

The Municipality of San Sebastian in carrying out some necessary work on Monte Urgull found it impossible to avoid upsetting the ground in the vicinity of the cemetery. General Arzadun on taking over his command as Civil Governor decided to free his countrymen from any suspicion of ingratitude, and having represented the matter to the Corporation it generously not only undertook the restoration of the cemetery, but further decided to erect a group of statuary and commemorative tablet as a memorial. The tablet, which is surmounted by an eagle, bears on its face the coats of arms of Great Britain and Spain with the following inscription in both languages:—

> "TO THE MEMORY OF THE BRAVE BRITISH SOLDIERS WHO GAVE THEIR LIVES FOR THE GREATNESS OF THEIR COUNTRY AND FOR THE INDEPENDENCE AND FREEDOM OF SPAIN."

At the foot of the stone are placed two field guns of 1812, one British and one Spanish, and by the side of the platform an allegorical group of British forming a "forlorn hope" in the act of storming a breach. This depicts the leader, Lieut. Maguire, 4th

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ASTOR, LENOX, AND
TILDEN FOUNDATIONS

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Regt., who fell at its head.[1] A gunner is also shown dragging a gun into position. At the foot of the monument is engraved in english and spanish :—

ENGLAND HAS CONFIDED TO US HER GLORIOUS DEAD
OUR GRATITUDE WILL GUARD THEIR ETERNAL REPOSE.

In addition to the above, a graceful thought had caused a stone to be erected on a nameless grave inscribed :—

HONOUR TO THE HEROES KNOWN ALONE TO GOD
1808-14 1836-38

To honour the occasion the British Government had despatched H.M.S. *Malcolm* which brought out the British gun above mentioned. In the unavoidable absence of King Alfonso, the ceremony of unveiling the memorial was carried out by Queen Victoria Eugenia in the presence of Queen Christina, the Prince of Asturias, Prince Jaime, the British Ambassador, Sir Charles Oman, M.P., General Arzadun, the Alcalde and Corporation of San Sebastian and many other distinguished notabilities. A guard of honour consisting of a company of the Regiment of Sicilia, 60 British blue-jackets and the crew of a Spanish war vessel was posted at the foot of the monument.[2]

Space does not admit of doing more than allude to the speeches, but they can all be read in full in the May number of the *Memorial*.[3] The Civil Governor first explained the *raison d'être* of the ceremony, then the British Ambassador read out a gracious message from King George V, and after the Alcalde on behalf of the municipality had accepted the sacred trust of the cemetery, Sir Charles Oman, M.P., in the name of the British Government and Army gratefully thanked the noble Spanish nation for its generous act.

[1] In order to be more readily distinguished, Maguire had discarded his regimental shako and substituted the cocked hat of a staff officer. A painting of this historic incident was exhibited in the Royal Academy of 1912, the artist being Mr. J. P. Beadle, the same clever painter who depicted Capt. Norman Ramsay charging with two guns of I Troop, R.H.A., through the French lines at the battle of Fuentes de Onoro in 1811.

[2] The illustrations (reproduced by Davey of Harrogate) were taken at the moment of the unveiling and show the Queen, General Arzadun and the Guard at the salute.

[3] Also in an excellent abridged account of the function which appeared in the *Times* of 30 September and *Morning Post* of October 1, 1924.

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II.

General D. Juan Arzadun, K.B.E.

This distinguished artillerist and littérateur, the moving spirit in the ceremony above alluded to, is well known by name to the readers of the R.A. Journal, in the columns of which his historical writings have frequently appeared, chiefly in the years 1909-12. These are all valuable to students of the Peninsular wars and the chief items are :—

(a) *Battle of Bailen, 17-19 July, 1808* (R.A. Journal, March, 1909). Here General Castaños and the Spanish forces gained a sweeping victory over the French under Dupont.

(b) *Giron Diaries*, 1808-14 (Journals R.U.S.I. and R.A., 1909-14). Arzadun having by a happy chance discovered five bulky volumes of diaries and documents collected by the distinguished general and statesman D. Pedro Augustin Giron which had lain unnoticed for a century in private hands, edited them and published them serially in the *Imparcial* and kindly placed them at the disposal of the present writer who utilized them for the R.A. Journal in two series (Vols. 37 and 40). The second series consisted of letters of 1814 from Giron to his father and are full of interest.

These publications in our columns led to a pleasing sequel in the shape of mutual congratulations between the *R.A. Journal* and the *Memorial de Artilleria* in 1913, resulting in the latter reprinting some interesting letters regarding the Battle of Vittoria, fought 21 June, 1813, and presenting the R.A. Institution with 55 copies of facsimiles of the letters for distribution amongst R.A. Officers (Vol. XL No. 7). General Arzadun now holds the important appointment of General in command of the *Escuela Central de Tiro* of the Spanish Army.

This then is the man whom "the King has delighted to honour" with the dignity of a Knight Commander of the Order of the British Empire, and we of the Royal Artillery respectfully offer our comrade our most hearty congratulations.

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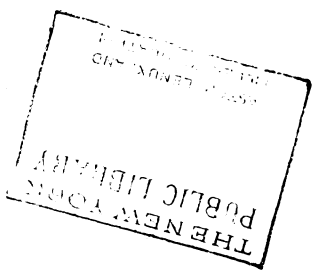

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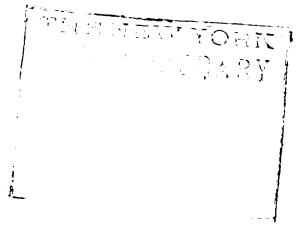
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TIGER SHOOTING IN ASSAM.

By Captain P. J. K. Warren, R.A.

I HAD heard much of the prowess of Mr. Curtis Skene, of Badlipur in Assam, as a sportsman and big game shot. I was moreover possessed of that ambition to shoot a tiger common to those who sojourn in India. When therefore the chance came this hot weather to join Mr. Skene in a shoot along the banks of the Brahmaputra I lost no time in applying for leave and in the middle of April we foregathered at his bungalow in preparation for the trip.

There were four guns—Mr. Skene, Mr. Charles Chamney, Mr. Donald Fleming and myself. We all intended to sleep in one large tent with our baggage reduced to a minimum, for we were to stay out as long as we felt inclined, moving camp when necessary in order to ensure getting a good bag. Nevertheless there was much to be prepared. Elephants had to be collected, howdahs fitted, food and stores arranged. Skene has done this kind of thing before—he knows all the owners of the elephants and for weeks messages had been coming in with news of tigers.

One fine morning, then, Fleming and I rode down to the river as an advanced party to see the elephants and baggage across the Brahmaputra.

The scene was most interesting. Thirteen elephants had been hired from the neighbouring villages and these were standing about or amusing themselves in the water. Some of them belonged to the riverside "Miri" people accustomed to swimming their animals in the rivers, but many of the elephants had Assamese mahouts, terrified of the water and afraid to cross the river alone. The whole party, therefore, had to cross together and in due course the leading elephant took the water amid invocations and cries from the mahouts to their various gods. The broad swift river and the still morning, the strange cries of the mahouts and of the boatmen who ferried us over made a lasting impression.

It is not easy to ride a swimming elephant. He is very fond of "sounding" and often only the tip of his trunk is visible. The mahout stands on the back of his charge and grasps a pair of rope

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reins attached to the animal's neck. Control, therefore, is difficult, and many of our elephants turned back and had to be started again.

We pitched our camp on the other side of the river at a spot close to good elephant feed and water, and in the middle of the country we were going to hunt. A tiger shoot in these parts is indeed a rare event and we were soon surrounded by a crowd of the local gentry. We heard ourselves discussed from head to foot—our clothes, our tent, our guns, our food, but it was only by precept and example and much perspiration that all these things were finally transported from the boat to the camp. One "Sintukia" worked like a Trojan, he had been pretty drunk the night before and was heard insisting that the other servants should treat him with the respect due to a "Sadhu." Whether he had any claim to this rank is doubtful but he wore his hair like a coil of rope on one side, with the effect that his head had a permanent list to starboard, and he said his prayers every morning standing up to his middle in the Brahmaputra. A useful fellow to have in camp—Sintukia—carries the baggage, fetches the eggs and milk and skins the tigers. A comical old bird with a sense of humour. Although it annoyed us that they would not help in pitching the camp we were very glad to hear all that the "Gaon burras" or village headmen had to say about the local tigers. It appeared that there were plenty about and that four had killed the previous evening in a neighbouring village. So far so good—apparently we had run into a whole family of them; but Skene, who knows the oriental habit of only saying what will please the hearer, would not believe all he heard and went off on an elephant to have a look. It was dark when he returned and the rest of us were wondering how we were to have dinner amid the plague of stink bugs and mosquitoes which descended upon us, but the news that Skene had seen the tracks of four tigers in a nullah near by put this inconvenience in the shade and we eventually turned in full of anticipation for the morrow.

We were astir before dawn and there was much bustling and some confusion collecting the hobbled elephants and fixing the howdahs. I was mounted on an old cow-elephant who had been on this business before and, what was more important, my mahout—opium-sodden old villain that he was—had been out many times and knew the ropes.

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We soon came upon the tigers' tracks and then it became apparent that the animals, scared perhaps by the sounds of the camp had moved off over-night. We tracked them some few miles and finally crossed a dry river bed with a wide expanse of sand. There were the pug marks, mother and three nearly full grown cubs and the tracks not two hours old. Straight in front lay a small patch of tree jungle practically isolated. Not a doubt but here our quarry lay. The word for silence was passed down the line, the cheerful buzz of conversation ceased and the guns alone moved forward communicating only by signals. Elephants may crash through jungle breaking branches as they go but let a tiger hear a human voice and he is alarmed at once.

Skene had a look round and a few words with the shikaris and then placed us in likely trees on the outskirts of the wood. Our elephants joined the others and moving round to the other end of the jungle commenced to beat towards us. This was my first experience of this kind and I remember remaining in a most uncomfortable position all the time, fearing to move lest I should make a noise or lose an opportunity. My tree harboured a crowd of the most savage brown and black ants I have ever met—about $\frac{3}{4}''$ long. They bit through my Jodhpur breeches and crawled up my legs. Presently a tremendous report re-echoed through the jungle—a ·470 express makes a fairly good noise. Of course I was immediately on the qui vive straining every nerve to hear anything move. I could see only a few yards in front of me but my tree covered a jungle track and suddenly in this path without any sound whatever appeared my first tiger. He was walking slowly towards me looking attentively around and I was able without any difficulty to give him the orthodox shoulder shot which dropped him in his tracks. I had bagged my tiger.

It seemed that I had hardly time to reload when right on the trail of the first beast a second tiger noiselessly appeared. I did not think a tiger would walk straight to the sound of a rifle but apparently they have no idea of direction in such cases, and this one trotted up to within a foot or so of his dead brother without any sign of suspicion—then I got him square in the shoulder and he too pitched forward and lay still without a sound.

The beaters now came up and we all foregathered for news.

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Skene had shot at and wounded a tigress who had made off to some thick "khugaree" or high grass a few hundred yards away; I had bagged two large cubs nearly full grown and the others had not seen anything. We decided, of course, to push on after the wounded tigress and proceeded to load up the dead tigers on elephants. It was some time before we could find an elephant which would kneel quietly beside the carcases, many of them trumpeted and backed away on being brought near. They all have a wholesome respect for the lord of the jungle, even when dead. The khugaree patch, fortunately, was not very large and Skene went off with the beaters to put up his wounded tigress. The fourth tiger which had not been seen was probably with his mother so we had two beasts in front of us and one, having been wounded, in a highly dangerous condition. Skene had with him some "bombs" made of Bickford fuze and gunpowder crimped into empty cartridge cases. These made a fine noise and proved very effective in chasing out reluctant tigers. The rest of us got into suitable trees and Skene proceeded with his bombing. Sure enough after a couple of bombs out dashed a very scared young tiger. Chamney and Fleming each fired at him, a difficult target in the grass, but the latter got him with his second barrel—a clean shot in the back. In the meantime Skene had come across his tigress dead in the tall grass—she had been hit rather far back in the body—and thus we had accounted for the whole family. It was still quite early in the day, we had been out only four hours and had killed four tigers, a very promising start to our shoot. We had no more "khubber" however, and thought we had done enough for the day so we marched back to camp to skin the animals and prepare the trophies.

So far so good, tiger shooting seemed easy enough, and although we were tremendously pleased at our bag I felt that it was a little tame. Where was the snarling, charging, savage beast and the fearful excitement of which I had heard so much? If the reader will bear with me a little longer I will tell of the thrilling hunts which took place during the days to follow and try and convey to him the excitement of some of the incidents we were to experience.

The camp that evening was a lively scene. The whole countryside had, of course, heard of our coming and crowded in to see the tigers and the strange sahibs who had shot them—incidentally also

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THE FIRST DAY'S BAG.

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to secure if possible some of the fat from which to make an ointment said to be invaluable for rheumatism. Other strange portions of the tiger's anatomy are supposed to have medicinal or magical qualities and a strict watch has to be kept to prevent pilfering of whiskers—a very powerful protection I believe against the evil eye. This evening was clearly an occasion for a little celebration, in which the mahouts and shikaris rightly considered they should join, so a liberal issue was made of country liquor and opium without which these people can hardly be got to do anything. The mahouts are a difficult lot to manage, being drawn from low castes addicted to opium and "bhang." The strenuous camp life is hardly to their liking and they are not above deserting with their elephants if they are not kept in a good temper.

The following day no news was brought in but we spent a pleasant day round the camp with our guns—green pigeons, jungle fowl and cock florican are all very nice indeed to eat and the pot was plentifully supplied with these the whole time we were out. On the next day also we shot no tiger but nevertheless had some very interesting experiences. A tigress and cubs were reported to be killing some five miles away. It was raining with that delightful persistence so familiar in Assam as we plodded along in Indian file. My old she-elephant had developed a sore back the first day so I was mounted on another elephant driven and partly owned by a stalwart young Miri named Popadum (or so it sounded to us). Popadum was the wit of the party and kept up a ceaseless flow of banter with other men and also, it must be added, with the girls in the villages we passed. But even Popadum's high spirits were damped by this incessant downpour and it was a silent party which filed into a Miri village about noon. All these riverside villages are built on "chungs" or piles. The typical house is a large low thatched building of a single room in which a large family of perhaps 20 or so live together. A slatted wooden slope leads from the ground to a small verandah in front of the house and here are collected the womenfolk and a swarm of naked children. Near by, the hand loom is always in evidence, for they make their own cloth, weaving a kind of "saree" in colours and patterns sometimes very attractive. The Miris are Mongolian in appearance and inhabit the banks of

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the great rivers; they are quite distinct from the Assamese and speak a different language. In this village, then, we dismounted and soon had a fire blazing in a cattle shed where we were able to dry our clothes and perform upon the tiffin basket. It appeared that our information was at fault, for the tiger news was some days old and it was no use beating on an old scent. Such is the fortune of this kind of shooting, we could not expect the first day's luck every day.

We had already decided to return to camp when a breathless and perspiring runner came up with the news that a tiger had attacked a cow near his village but had been driven off and was concealed in a patch of jungle. Up rose our somewhat damp spirits and the calvacade was put in motion. The rain too stopped and Popadum's tongue began to wag afresh. A march of a couple of miles brought us to an irregular patch of grass and tree jungle into which the tiger had been driven. His intended meal was shown to us, a large cow with deep fang marks in her throat. She was not dead, the cow-herd had seen the tiger spring and had run up with such a yelling that he had dropped his prey. Is it courage or lack of appreciation of danger which leads cowherds to do such things? I have heard of a case of an old man who, when a tiger seized one of his young buffaloes ran up at once with his "lathi" and actually beat the tiger off. Another time a tea planter was walking beside a hedge with one of his overseers when they saw a tiger lying asleep on the other side. The man immediately picked up a lump of earth and with a "Jao! Sala!" tossed it over the hedge. The planter melted rapidly away.

There was no doubt this time that we had come upon a good thing; so hastily arranging ourselves in suitable trees a beat was commenced. It was a quaint scene, the trees were few and the jungle fairly open so everybody had a good view of the proceedings. The neighbourhood is well populated and they had been waiting for us for some hours, so hundreds of spectators had collected and were now manning all the available trees to see the fun. These same people would have been very useful as stops, had we had time to arrange them, but it was getting late and they could not be prevented from climbing the wrong trees. As soon as the elephants entered the grass they put up the tiger and then there ensued such a yelling and cheering from all sides that we knew our

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chances of getting him were small. The beat proceeded but the tiger broke in the wrong direction and in the approaching darkness he got away.

The next day we got all we wanted and far more than we expected of real tense excitement and the thrill of the hunter in pursuit of dangerous game. News had come in that a tiger had killed and had dragged his prey into a small patch of tall grass where he was presumably feeding. This was fine fresh news—the best kind of "khubber" one can get—and we were off at once riding our elephants with pads only as we had found that long marches with howdahs had tired the animals which were unaccustomed to this work, and we were afraid of their crocking up. We arrived upon the scene, then, with not a howdah between us and found that there was no tree for hundreds of yards. We should have to shoot from the elephants and from awkward sitting positions on the pads. It is necessary to try this in order to realise the limitations of the position; I myself sat down firmly behind the mahout and rode the elephant's neck like a horse. My field of fire was seriously restricted but I was at any rate firmly mounted and of this I was very thankful later on. Skene with his usual skill immediately took in the lie of the land and posted us, partly concealed by the long grass, in positions overlooking a sparsely covered neck which connected the grass patch in which the tiger lay with similar cover behind us. As soon as the beating elephants entered the grass the tiger was spotted and the great hunt of the shoot began. He had evidently heard the guns being posted and knew he must come practically into the open to reach further cover; consequently he was most reluctant to leave and ran about in the grass almost at the beaters' feet. Imagine the scene, a still hot morning with sound carrying far, the flat green pasture-land interspersed with patches of scrub jungle and twelve foot high grass, some distant trees loaded with onlookers whose excited talk occasionally reached us across the fields. In the centre of the arena the principals awaited the conflict with bated breath, at least I know one of them did for I think I have never experienced such a moment. The guns sitting still on their obviously nervous elephants, the line of beaters slowly advancing with weird noises, and somewhere in the centre the tiger, no doubt more strongly moved than any of us. The beat seemed

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to be concentrating towards my corner where the remaining grass was highest and presently the chief beater threw in a bomb (one of the cartridge-case kind I have described before). That apparently decided the tiger for immediately his great tawny form burst with a "woof" from the cover and dashed across the open straight towards me. Actually he was not making for me but for the nearest cover upon the corner of which I stood but the effect was just the same. I let off a hasty snap shot but my elephant of course saw him and raising his trunk he uttered a shrill trumpet and whisked around faster than I have ever seen an elephant move. In turning I have a recollection of the tiger cantering past quite close, snarling savagely at us and as we lumbered away through the grass I caught another glimpse of him and had another shot but again missed. I do not know which was most frightened, the elephant, Popadum, or myself. I think perhaps the elephant, as Popadum proved himself plucky enough later on and I had a rifle and was too busy trying to use it to think of anything else.

Fortunately the second piece of cover ended a few hundred yards further on, and it was clear from the absence of outgoing tracks that the tiger had not gone further. We now had to work more cautiously, for the tiger had been shot at and was possibly wounded, so the beaters went forward behind a barrage of our useful little bombs. The quarry was quickly found again and rushing down through the grass to the further end, lay in a particularly thick clump from which even the bombs could not dislodge him. It needed a charge of No. 4 shot, some pellets of which actually hit him, to move him from here and then be flashed into view for a second at the end of the grass only to leap back immediately he saw the guns on their elephants. Three of us fired snap shots this time but all our elephants were frightened and restless and would not stand and we all missed.

The excitement was now intense, most of the elephants had seen the tiger and would not keep still, three had bolted altogether and were observed viewing the proceedings from afar—I suspect their mahouts of not making much effort to stop them—the other mahouts had got very shy and were not at all keen on entering the grass. As a last resort, therefore, a line was made of beaters with guns on the flanks and centre. This put heart into the mahouts and advancing in

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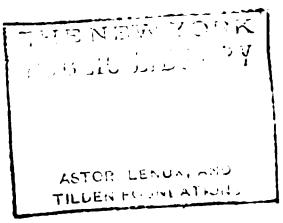

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close formation we at last succeeded in driving the tiger into the open where Fleming with a fine shot from his elephant, now more steady, succeeded in laying him out. He proved to be a very heavy male, not long, under nine feet, but massive and powerful. It was lucky for some of us perhaps that he did not show much spirit. More than once he could have sprung upon an elephant but made off instead. We found a wound in the flesh of his fore paw, evidently inflicted by my first shot, but it did not break the bone. On looking at our watches we were surprised to find that we had spent six hours hunting that tiger; it seemed about half an hour to me. This I look upon as the climax of our shoot, but nevertheless in subsequent beats we had some exciting experiences.

The next day was full of interest and gave ample proof of the well-known fact that in tiger hunting there is no certainty. We fully expected that the tiger which we had hunted and so narrowly missed on Wednesday would immediately move out of the district; but to our surprise word was brought in that he had killed again in exactly the same spot. This time everything was carefully arranged, Skene spent an hour or so prowling about with the shikaris examining pug marks and finally decided that the tiger lay in a certain patch of jungle. On this occasion Fleming went round with the beating elephants. Mahouts can very seldom be trusted to carry out a beat alone; unless a sahib is with them they will not keep line and a gap is left, of which the tiger is not slow to take advantage. The rest of us climbed suitable trees on the outskirts of the jungle and awaited events.

Sure enough, as the beat drew closer, the "view halloo" was raised among the men and a fine tigress bolted out of the jungle close under Chamney's tree. Apparently his rifle caught in some creeper, at any rate he missed, and away bounded the tigress towards the next cover. She was a magnificent sight, taking great leaps, just in the same way as you often see a cat cross a wet road, very anxious to get to the other side. She had not gone far, however, before she came in range of Skene's rifle and he bowled her over with a fine shot. One felt very sorry for the poor brute as she reared aloft roaring and pawing the air, but a second shot finished her off and she lay dead—a goodish tigress 8ft. 8ins. long.

Apparently we had now cleared out the immediate neighbour-

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hood, and acting on local advice we moved our camp some few miles further down stream where the country, although more difficult, was reported to harbour several tigers. The jungle was in fact so dense and extensive that I think we were lucky in locating a family of tigers after only one day of arduous tracking and enquiry. However, on the third day, the presence of a number of "hoogans" (vultures) which we could see on some high trees away over the jungle indicated the probability of a kill and away we went on a cautious reconnaissance. Either we were extraordinarily lucky or Skene's woodcraft is marvellous; at any rate we rounded up those tigers in a broken mass of marshy jungle where one couldn't see many yards in any direction, and how many tigers there were originally we were unable to say. I didn't see them myself in the first beat but as the elephants came up there broke out a regular fusilade just on my right but out of sight in the undergrowth. Fleming was with the beaters and three tigers suddenly appeared between him and Skene who was in a low tree. Between them they laid out two, the tigress and a large cub, and wounded a third, who got away into some long grass, part of a stretch of open country which bordered the jungle.

Here we had a great time; rather a repetition of the hunt a few days previously. The tiger was known to be wounded and the mahouts were none too keen to go in. However a line was formed and the guns remained on their elephants watching the exits. Somehow or other the tiger must have broken back through the beaters for suddenly there was a tremendous outburst of roaring and squealing and the tiger charged down the back of the line chasing all the elephants out of the cover like sheep before a dog. It was really a ludicrous sight and there was much laughter, particularly at my expense, since my own elephant took fright at the general stampede and led the way across country at full speed. One of the elephants had been mauled slightly in the hind leg but apparently the tiger was too badly wounded to do much damage.

We gathered round the spot again and tried to form another line but the mahouts were all very polite and insisted in giving each other first place—none of them would enter the grass. Finally there was nothing for it but to go in ourselves and chance the animal getting away unseen. Fleming and I, therefore, with

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one volunteer, shoved our elephants in and, passing back and forth across the grass, trampled it into lanes which the other two guns were able to cover. We then proceeded to one end and by the slow process of moving across and back while at the same time advancing we eventually squeezed the tiger into one of the lanes where the "coup de grace" was duly administered.

This was a satisfactory end to our shoot, for end it proved to be, the weather turned wet and the mahouts became restive and wanted to go home. They appeared to think that we ought to be satisfied with our bag of nine, as indeed we were.

If you have been interested in this amateur narrative, you may care to hear the story of the tenth tiger shot under rather different circumstances a few days after our return to Skene's bungalow.

There still remains round the estate a certain amount of rough and useless jungle called "korkhani," low lying land closely intersected by little nullahs and heavily overgrown with bamboo and creepers. This almost impenetrable jungle provides splendid cover for tigers and for a year past a tigress and family had been in the neighbourhood, repeatedly evading Skene's efforts to bag her.

One morning word was brought in that a young buffalo had been taken and that the kill had been dragged into a place where it lay half consumed. Skene and I were off at once and after a difficult crawl through the dense undergrowth encountered the unmistakable smell of the tiger at home and saw the partly eaten buffalo. We then went round to where a jungle path cuts off this part from the main forest and there we made two machans.

Leaving a man or two on watch we went home to lunch and to collect some beaters. In the afternoon we returned with about fifteen garden coolies, my wife and I got into one machan, and Skene took his little daughter—aged about ten—into the other. A few stops were placed in other trees to tap sticks and guide the tiger in our direction and the coolies began to beat.

It was a damp afternoon and the cicadas or large tree crickets were making such a noise that I felt sure that I should never hear the tiger's approach. Suddenly, however, the crickets were silent and save for the distant calls of the beaters all was still—evidently something was about to happen.

A slight rustling away to my left and the tigress appeared

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among the undergrowth, hesitating before crossing the path. I fired at once but the shot hit the ground just in front of her and with a loud "woof" she sprang back and bounded across our front into a thick clump immediately opposite my tree. I heard her stealing along an animal track which led just under the machan and presently a huge dark form (from above the tiger appears darkish) hurtled across the pathway. I fired of course and hit her somewhere for she lay roaring and rolling out of sight a few yards away. I placed another shot at the spot where I supposed her to be and the roaring ceased, though we heard her crawling away.

We now had to undertake the unpleasant task of following her up on foot and after the usual pause of about an hour to let the wound stiffen a cautious advance was made. A good deal of blood led us on for some distance and at any time we expected to find her dead; but the going was slow and darkness began to set in, so we were forced to leave the matter till the morrow. The next day we set out full of hope and were able to follow the old blood trail till we came upon a pool of fresh blood. This was both promising and disconcerting. Evidently she was not far ahead of us and must have got up and moved on at our approach, but it showed that she was not mortally wounded. Unhappily, just then it began to rain and very soon no trace of blood remained. This was most depressing, we knew she must be somewhere close at hand and unable to move much, but nothing could be done without elephants, and for them the going would be most difficult. However, the next day, and this was my last day of leave, the rain had stopped, so boarding an elephant I spent several hours forcing a passage in all directions round about the scene but to no avail—the tigress had disappeared and a disconsolate officer was obliged to return to his station.

Judge of our delight when in a day or so, we received a wire from Skene saying that he had shot the tigress and was sending me the skin. A coolie had come across the beast in the jungle and Skene had shot her easily. Her hind leg was found to have been shattered and of course she had had no food for many days.

Poor tigress, I am afraid mine was a very bad shot.

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HOME—BY THE OVERLAND ROUTE.

By Colonel H. Rowan Robinson, C.M.G., D.S.O.

THE P. & O. line offers a comparatively rapid mode of transit between India and England, is fairly comfortable, not inordinately expensive and, above all, has weekly sailings from both ends, working on a fixed time-table. Hence the taker of leave, especially if the holiday is to be a short one, almost inevitably wires off for a return passage for dates which allow the maximum of time at home. Having got his ticket his mind is free from all anxiety. He will follow a regular routine: the mail train to Bombay; embarkation; the voyage, with its halts at Aden, Suez and Port Said; disembarkation at Marseilles; *train de luxe* to London; in due course the return journey in similar fashion. All the charms of convention, regularity, punctuality and bridge. Other lines offer cheaper rates, equal comfort but less regularity, and are generally favoured by officers either travelling with their families or going on long leave when time is a matter of no great importance.

Many people would like to make the journey India—England by a different route every time and may plan accordingly: to go *via* Italy; *via* Africa and the Nile; *via* Persia; but such plans generally crash owing to inability to fit in dates; the illness of a chief; a local war; and the schemer finds himself once again in possession of a return ticket by P. & O. This year I planned to travel *via* Baghdad and Cairo hoping for a fly across the desert. The air passage was, however, refused, so I decided to try the overland motor route Baghdad to Beirout.

I left Peshawar on the 6th March and embarked at Karachi on the 8th (Sunday). My boat—the fast mail belonging to the British India Company—was well equipped with modern appliances: real water taps; windows instead of ports; movable chairs; and was most comfortable. The route was more interesting than that dreary spell between Bombay and Aden, for we ran more or less in sight of land all the way. We stopped at Bushire for a few hours and saw

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there the Persian fleet—two ships that have ridden at anchor during the years that have elapsed since their arrival from Germany after the war.

We reached Basra early on the 12th. The last hour of the journey up the Shat-el-Arab was delightful: on either side low banks covered with date palms; ahead a distant view of river and desert; dhows with bellying sails coming down stream against the sun; then a scene of busy quays and craft of all kinds and sizes. Ashore the aspect was materially different. It reminded one in its mud and desolation more of the Ypres or Somme battlefields than of a civilised station. It was quite clear that the British tax-payer had made up his mind not to waste money there.

Apart from the scattered camps of tent and hut the European town and adjacent bazaar are miserable affairs, though the bazaar at the native city of Basra some miles out is worth a visit. As it is impossible to live at any of the hotels and as the mail train for Baghdad leaves on the Friday, we had to spend the night on the ship—that privilege being accorded us for the sum of Rs16. Life at Basra appears to be better than my picture of the place for, apart from soldiers and air force, the European colony numbers 800, there is good shooting, fair polo and hunting and the local *jeunesse dorée* was that very day trying to recover from the results of a very festive hunt ball held the previous night.

The Baghdad train left at 10 a.m. from surely the most dreadful looking station in the British Empire (cum Mandatories). A party of ten of us had taken a bogie containing three carriages and arranged with the railway authorities (who always gave us every assistance) to have it dropped at Ur for the night. We arrived at that station about 4 p.m. and spent the night there, cooking food for dinner and breakfast, no provisions being obtainable on the spot. In the evening and again in the morning we visited Ur of the Chaldees. Unfortunately the excavators had just closed down for the season, but the nature of the work they had executed was clearly evident when studied with the assistance of recent lectures on the subject issued in pamphlet form. Close by is the town of Tell-el-Obeid, older than Ur by some 2,000 years, where the remains of a modern restaurant may be seen at which the Urian tourist of the day of Abraham took his meals when visiting the ruins.

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At mid-day on Saturday a slow train picked up our carriage and dropped us at midnight at Hillah, some sixty miles from Baghdad. On the Sunday morning we visited Kish. We had ordered three Ford cars for the party to be at the station at 8 a.m., and the three drivers raced each other over unspeakable roads to our destination. Here we found excavation in full swing, and the excavators, headed by Mr. and Mrs. Mackay, ready to explain what would without their assistance have been quite impossible to understand. Much of the brickwork is so old and so poor that to the unpractised eye it differs in no way from the surrounding mud. Kish must have been a great city, for its remains cover a vast area of ground, but nothing is known of its history beyond what is now being discovered. The best find of tablets was made just as we arrived. In the Museum what took our fancy most were the neat little manicure sets, the bead work, a gold chain and the toy chariots.

The excavators entertained our whole party of ten most hospitably to an excellent lunch, after which we returned to Hillah and went on thence about six miles to Babylon. The lack of a knowledgeable guide detracted greatly from the value of this visit. We saw just what was obvious and nothing more. At Hillah we again had to cook our own provisions, there being no local shop or restaurant. It is rather a messy affair doing these things in a train for some days, especially as our arrangements made on the spur of the moment were very primitive. The cups, plates and spoons of *papier maché* with which we were provided later on the desert route would have been of great value.

At midnight another train picked us up and took us on to Baghdad which we reached at 6 a.m. on the Monday morning. We had been warned that the city of Haroun al Raschid had fallen from its high estate and that we should not expect much of it. We were, therefore, pleasantly surprised. The Tigris was full and wide and rapid—a real river; the bazaars surprisingly interesting in respect both of persons and things, and the great Shiah shrine of Kazhimain about five miles away well worth a visit. The place seemed alive with ex-gunners, their ranks including the Air Officer Commanding in Iraq and his Chief of the Staff and several of the agents and officials of the Nairn Desert Transport Company.

The Nairn Brothers—New Zealanders—started a motor trans-

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port company after the war in the Damascus-Beyrout region. About eighteen months ago their attention was drawn to the possibility of a route across the desert from Baghdad to Damascus. They took up the idea with enthusiasm and, after overcoming a number of the minor difficulties incidental to the initiation of any great undertaking, have established a sound and rapid communication between the two cities. Convoys start now from Baghdad on Tuesdays and Thursdays carrying passengers and mail. The Tuesday convoy is the faster and enables passengers to reach London in 7½ days. As I was in no great hurry and wanted to see something of the city, I waited for the Thursday convoy.

We started at 2.30 p.m.—five cars in all—crossed the Tigris by the old bridge and, 32 miles further on, the Euphrates. Another 40 miles and we reached Ramadi, a far out-post of civilisation, where we found a flight of aeroplanes which had been rounding up the miscreants who had shot a French lady travelling further to the North. Here the special route taken by the Nairn Company begins and hence it runs for 459 miles across unadulterated desert, till it reaches the Damascus—Aleppo road, fifteen miles from the former town. Only one well—that at Rumdah—is passed *en route* and the water there lies very deep and is slimy, so all the necessary provisions and water for the journey have to be carried. The first desert meal was supper at 9 o'clock. The cars formed a laager round the supper area with their lights illuminating the tea, cold chicken and other delicacies provided. The following morning there was trouble with one car and it had to follow behind in tow. This caused some delay, with the result that the main body of the convoy reached Damascus at 4 p.m. instead of 1 p.m. We were then only able to spend an hour there before pushing on to Beyrout and we had to do the greater part of the beautiful journey over the Lebanon in the dark.

We reached Beyrout at 9 p.m., all pretty tired with a non-stop journey of 603 miles. The performance of the drivers is a fine feat of physical endurance, not only because of the great distance but also because during the night they have to keep their attention closely fixed on the track which is marked but faintly and that only by the passage of previous convoys. The journey across the desert is not of course, particularly interesting. But little animal life is encountered: occasional gazelle, wolves, wild turkey, rats, all of

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which make tracks as soon as they see the leading car. There are often caravans about Rumdah, and after rain a few Bedouin camps may be met with elsewhere. The desert in spring is greener than one might expect. The mirage is so great that vast lakes disappear only under the wheels of the motor.

The cost of the journey Baghdad-Beyrout is £25, including baggage amounting to 70 lbs., food on the way and a meal at an hotel in Damascus. Other companies have followed the example of the Nairn Company and run convoys further to the north along the edge of the desert, halting for at least one night on the journey. The Nairn is perhaps the safer line as the company subsidises the principal local brigand and he has up to date prevented any interference on this road.

From Beyrout one may proceed home by one of half a dozen routes:—

(a) Rail to Constantinople:—very slow, many changes, inordinate delays at each station of change.

(b) Sea to Constantinople *via* Tripoli, Alexandretta, Messina, Adalia (or Limassol), Rhodes, Smyrna, in Lloyd-Triestino boat (cost £14.8.0); thence on to London by Orient-Express (cost £30).

(c) Sea to Constantinople, Piræus and Venice or Trieste in Lloyd-Triestino boat and thence by train.

(d) Beyrout to Marseilles *via* Alexandria by the Messageries-Maritimes (cost £39), thence to London (£7).

(e) Beyrout to Haifa by car, thence to Alexandria by train, thence by Lloyd-Triestino to Trieste or by Messageries to Marseilles.

The two last are the fastest routes and those generally followed. (Cost, Baghdad to London, £72.) And there are sundry other methods of getting home by lines with irregular sailings.

My own choice fell on the sea route to Constantinople and the rail route on. I should have liked a day at Beyrout for a visit to the ruins at Baalbec, but there was no time. Actually I missed my boat owing to wrong information and had to motor to Tripoli, 50 miles along the coast, to catch it. However, it was a delightful drive—past the legendary battleground of St. George and the Dragon—past Nahr Kelb and its tablets, ancient and modern,

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inscribed with the feats of the Assyrian armies, of the Crusaders, of Napoleon III, of Allenby and of Gouraud; past Byblus, a riot of ancient ruins, bright-coloured bazaar and sunshine, a happy hunting ground for an artist; past many monasteries, Greek and Maronite, perched high on the Lebanon; through cornland and many orchards of fig and vine, olive and mulberry—a pleasant change after the long sandy stretch of the desert—and so to Tripoli whose ancient walls had once for five years withstood Raymond de Saint Giles and his Crusaders.

The embarkation of a stranger at this small port shattered the nerve of the local French functionary. After studying my passport from every angle he gave me a visa to the next port—Alexandretta—but evidently with a heavy feeling of the responsibility incurred in vouching for me. The ship—Lloyd Triestino—was an excellent boat, fitted up in modern style; single cabins, clean, good food and attendance—in fact, everything one could want. The passengers consisted of a retired Colonial Governor, his wife and niece, a retired gunner General, a number of American tourists and a few German business men.

Our first port of call was Alexandretta—interesting from the discussion that has raged since 1914 over the part it might have played in the great war. It consists of a narrow belt of houses along the sea shore and offers no attractions whatever. It almost justifies even now the epithet *scabiosa* formerly applied on account of the prevalence of leprosy in the town. The same may be said of Mersina which we reached on the following day. The captain told us we should find Adalia—at which the Lloyd-Triestino boat calls alternately with Limassol—even less attractive. This was far from being the case. A rocky fortress perched on steep cliffs; a bay of gorgeous blue backed by snow-clad mountains; rivers discharging to the sea by a number of waterfalls over the cliffs; ruined towers and walls; gaily-coloured markets; bearded camels; minarets and mosques, some domed with tiles; charming subjects at every turn for the artist.

Next day, Rhodes, replete with its associations of the old Knights Templar, men who lived in handsome fashion in the spacious days "when knights were bold." The museum, in a splendid old auberge, is full of statuary, pottery, jewellery from all the ancient civilisa-

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tions of the Ægean archipelago—Greek, Roman, Phœnician, Crusader. The island has a very attractive look and most of us would willingly have spent a few days instead of a few hours there.

Through the night we threaded a maze of islands to Mitylene, in Lesbos—to untutored minds a fine feat of navigation, for there appeared to be few, if any, lighthouses to lend the key to the labyrinth. Here we considered the ten dollars charged for a Greek visa to be a prohibitive price for spending an hour ashore and contented ourselves with studying the old fortress on the eastern arm of the bay and the evolutions of a battalion of Greek troops at platoon training.

Into Smyrna four hours later, a long approach by shallow seas to a spacious land-locked harbour. The great emporium of the Middle East has fallen sadly from prosperity since the war of 1919 when the Greek burnt everything Turkish and the Turk burnt everything of the Greek. The greater part of the European quarter on the sea front is a mass of roofless ruins—hotels, cafés, warehouses. Elsewhere there is business indeed, but it is far from lively. The Turk is a fighter and a ruler. Trade and commerce were carried on by the Greek and the Armenian. Now that he has driven them out he finds it hard to get along without them and yet, with the strong nationalist spirit prevalent, struggles hard against such an admission. He has no notion of construction. He makes repeated plans for rebuilding the town but in six years they have come to nothing. Perhaps it is as well, for in the one great building he has constructed—the Legislative Assembly rooms at Angora—he omitted the rather important items of staircases and lifts. He will only accept European assistance and capital on terms overwhelmingly in his favour. That he should suffer from swollen head after his astonishing national revival is not unnatural, but if his credit is to survive he must take himself less seriously as a victor and more seriously as a trading nation. Apart from all of which we want his figs, his sultanas, his tobacco and carpets on reasonable terms. His disease of swollen head dates more or less from our departure from Constantinople. He beat the French badly in Cilicia. The French beat the Germans in the world war. Till then the Germans had been the greatest military power on earth. What heroes, then, we Turks must be! Such is his argument. Palestine

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is now regarded as a mild though regrettable incident in a military career otherwise untarnished.

We reached Constantinople at 2 p.m. on Sunday. Landing arrangements were bad. An enormous crowd of boatmen rushed on board and fought for our luggage; boatmen, porters and cabbies charged exorbitantly for taking us to the hotel, extracting about a pound sterling a head for a journey for which 5/- would have been ample. All the English and Americans on board went to the Pera Palace Hotel, so presumably it is the best. The Tutaklyon was the only other hotel even mentioned.

We have been so recently in occupation of Constantinople that no description of it is necessary. The weather broke soon after our arrival and heavy rain interfered greatly with sight-seeing. Under the advice of the Military Attaché, who asked me to say that he would be very glad to help any officer passing through Constantinople in every possible way, I visited the three great mosques, saw the mosaic of the Kahrié Djami, the illustrated Korans in the El Kaf Museum, the tomb of Alexander and the bazaars—Kapali Tchashi—but on account of the rain missed a number of other things I wanted to do. Trade, so far as one could gather, is in a bad way, extortionate charges to foreigners being the only apparent serious attempt at money-making. Half-a-crown is charged for a small whisky and soda and 1/6 for a glass of vermouth, so it is as well for the poor man to eschew strong waters and to make his stay in the ex-capital as short as possible. The Turkish Government now that it is settled in Angora takes no interest in its former capital or indeed in anything connected with the old régime; and, as Musapha Kemal is firmly in the saddle, no immediate improvement may be expected.

The Orient Express is being run on the same lines, except as regards speed, as before the war. It is well-appointed, well-staffed and comfortable, but runs about twenty-four hours slower than of old. In fact, it is a real crawl through Turkey and Bulgaria. I took it as far as Belgrade and continued in one of its carriages to Buda Pesth, the main portion of the train going on by Trieste. The journey is distinctly dull. Bulgaria is a land of peasants and peasants' houses in which there are no striking features and no fine buildings to be seen by daylight from the railway. It is not

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till one reaches the Danube that pleasure is to be gained from the scenery and then, short of Buda Pesth, only in a few places, notably Belgrade itself and Novisad. Buda Pesth is a charming little capital. I arrived about dusk and the outlook from my window across the Danube was delightful—the gay life of the streets, the broad sweep of the river, the lights on the hills beyond. The Hotel Hungaria possesses what must surely be one of the most beautiful of modern dining rooms, perfectly proportioned, well-lighted, decorated with considerable yet restrained taste. The Hungarians are friendly and helpful, their womenkind are certainly well above the average in beauty, and their shopkeepers have, like the Viennese, a fine art in dressing shop windows. With the sun of royalty shining on it, it would be as perfect a little capital as ever the brain of Anthony Hope devised. I had intended continuing my journey by steamer up the Danube to Vienna but the service did not start till a few days later, so I took train to Vienna. There I was unlucky in my hotel but was fortunate in hearing Battistini singing in *Ernani*. I went home *via* Cologne and Ostend. The train starts at 8.20 a.m., so that one has a long and very pleasant day in the Danube valley to Ratisbon and thence to Nurnberg, by far the most attractive part of the whole rail journey. It is an easy trip. One leaves Vienna after an early breakfast spends one night in the train and reaches London in time for dinner.

One of our troubles was the constant change of currency and the amount of calculation it required. The rupee lasted to Baghdad. Passage money to Beyrout and thence onward to Constantinople was paid in sterling. At Damascus—Beyrout the Syrian piastre is in use. On the boat at Tripoli passengers were playing bridge with the Egyptian piastre. At Alexandretta the Turkish piastre took the field; at Rhodes and for bills on the ship the Italian lira; at Mitylene the Greek drachma—all at values constantly changing. Then in the train every bill is made out in the currency of the country one is passing through, a procedure said to be due to the varying food prices in the countries concerned. The result is that at the end of the journey one finds oneself with small sums, generally too small to be worth changing, in every kind of coinage or paperage.

A general summary of expenses is appended:—

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	Rs.	£	£ s d
Karachi to Basra	270	20	
Bombay to Basra	300		22 10 0
Basra to Baghdad	66	5	
Baghdad to England by Nairn and Messageries ...		72	
			£97 or £99 10 0

Cost of tickets *via* Constantinople route would amount to about £95, but hotel expenses by this route counterbalance the saving.

A party preferably amounting to four, could travel 2nd class from Basra to Baghdad, from Beyrout *via* Marseilles to London or from Beyrout to Constantinople. From Karachi to Basra the second class may be excluded from consideration. It is crowded and consists almost entirely of Asiatics. In the Orient Express there is no second class; but if the journey is broken, say, at Vienna, one can travel the remainder of the route by second class. By no route would the total saving one could effect by the cheaper ticket amount to more than £12. One may also save a few pounds by travelling by the *Train Conventionel* instead of the Orient Express. The former is quite comfortable but one takes a day or two more over the journey and suffers more severely from the attentions of the passport and customs officials. My own total expenses, exercising more economy than the average traveller, amounted to £120, Peshawar to London. This sum included perhaps £5 expended in various purchases unconnected with journey-expenses.

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ON OTTOMAN SUBJECTS.[1]

By Lieut.-Colonel C. B. Thackeray, D.S.O.

THOSE who know a little of Turkey, will recognise a sinister double significance in the words "Ottoman Subjects." Of all Turkish topics, none were more intriguing than the human subjects of the late Ottoman Empire—Turks, Greeks, Armenians, Jews, and innumerable others of every race and creed and colour. It was no light thing to be an Ottoman subject. If you were a Mussulman, it meant freedom to be as lawless as you pleased at the expense of the infidels. If you were a Christian, it meant liberty to buy and sell, to live and breathe and have your being, just so long as it suited the immediate interest or caprice of the ruling race.

In 1908, when, in his hour of triumph, at the head of the Committee of Union and Progress, Enver, that upstart statesman, proclaimed the New Turkey of the Young Turks, he made an eloquent oration. "There shall be neither Turk nor Christian, Greek, Armenian nor Jew—under one blue sky, we shall all march forward hand in hand, proud to be Ottomans." Let us see how far this noble aspiration has succeeded.

Of all the belligerents in the Great War, Turkey has the best right to congratulate herself on its results. It is true she has lost vast tracts of territory, but she has found a solution to her most thorny problem—the tiresome matter of her Greek subjects. Wholesale deportation is so much more convenient than wholesale annihilation, and besides it sounds so much more respectable. Who would have thought that this troublesome question would have been so unexpectedly settled with the help, almost the connivance, of the late enemies of Turkey?

[1] It has been enacted by the Grand Assembly that, under the new Constitutional Charter, all Turkish subjects, without distinction of race or religion, shall henceforth be called Turks and enjoy exactly the same legal footing. If this proposal is adopted a Turk may be a Christian, Greek, or Armenian, or a Jew. The word Turk will, therefore, lose its old racial connotation, and all the inhabitants of Turkey will be known as Turks, just as in the days of the Ottoman Empire the lowest common denominator was Ottoman. The words "Ottoman" and "Ottoman subjects," will also lose their former significance and the title of this article its point. It is claimed that this measure will tend to obliterate racial schisms.

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But the Turco-Greek question is not dead. Treaties do not take enough account of human nature. People are too apt to forget that nations are not mere pawns in the game of international politics, to be thought of in terms of frontiers and populations. They are made up of men and women, with all their hopes and fears and prejudices, virtues and vices. To comprehend any international question one must understand something of national characteristics and peculiarities. Great harm can be done to both sides by rabid -phobes and -philes in the two camps. "Turquie Agonisante" is nothing but "Pierre Loti Agonisant." Hellenism has its Mr. T. P. O'Connor, who used to pose as a genial Greek with a Hibernian accent, and wore impartially an Irish or a Greek kilt. But the most dangerous champions are often those who speak with an intimate knowledge of the dry statistical bones of the subject, and none of the living forces of flesh and blood on the soil itself.

It is well known that English opinion in Constantinople and the Levant has always been very generally in favour of the Turk. There is some strange mutual attraction between the two races. At bottom there are certain similarities of character, and each race admires the reflection of itself, which at times it sees in the other. Among the most obvious of these qualities are a certain phlegmatic aloofness; an inclination to pursue their own courses, regardless of the opinion of others; and a quite unjustifiable distaste, amounting to contempt, for the facile self-expression of more volatile neighbours, Latin or Balkan. There is, indeed, a dignity and self-possession about most Turks, however mean, that appeals to Anglo-Saxons, and the poorest Turk has the manners of a gentleman. Both races are brave, with a stubborn, stolid courage of their own, and are at their best when things seem at their worst.[1]

Most people will agree that the Osmanli is a pleasant enough fellow to deal with in ordinary intercourse. In business he is unbusinesslike; the astute Jew, Greek or Armenian get the better of him. He is honest and straightforward. But sometimes his

[1] Aubrey Herbert's delightful autobiographical sketches, *Ben Kendim*, were published soon after his death in 1923. The present writer did not see his book until after this article was written. He was surprised to find in it many passages that expressed his own views almost identically. For instance, Mr. Herbert wrote: "It may be that there is some affinity between the characters of the two peoples; both are reserved, both are proud, both are silent, and both the English and the Turks have like tastes in sport. Such a friendship can bear a great strain, and it is a great strain that has been put upon it."

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method of writing off old scores, and compounding with his creditors, is too thorough for more squeamish parties. He *massacres the lot.* And so it would be among some of the races of India were it not for the restraining influence of the British. For the pious Oriental preaches something more than an eye for an eye, and a tooth for a tooth; he favours the practice of gratuitous optical and dental surgery, on infidels, on a non-reciprocal basis. Yet the Turk is not, like some Levantines, a dangerous individual to meet alone on a dark night, unless he has some special grudge against you. And, even then, I think he would choose the bright light of day rather than a dark night.

A hundred years ago Byron voiced the traditional British feeling for the Turks. He always preferred them to the Greeks. In one of his Notes on *Childe Harold,* he wrote: "In all money transactions with the Moslems I ever found the strictest honour, the highest disinterestedness. In transacting business with them, there are none of those dirty peculations under the name of interest, difference of exchange, commission, etc., etc., uniformly found in applying to a Greek consul to cash bills—even in the first houses in Pera." The poet enjoyed playing the rôle of *grand seigneur* in money matters, and was open-handed and generous. But he happens also to have been a particularly astute business man. In modern slang, there were no flies on Byron, as was only to be expected in the son of an impoverished Aberdeen household. His encomium is a tribute to the engaging simplicity of the Turk, rather than a just stricture on the Greek merchants, whose eye to business remained undimmed by the blandishments of the English milord.

He found the manners of the Turks "equal at least to Spaniards, superior to Portuguese." . . . . "Always excepting France and England, in what useful points of knowledge are they equalled by other nations. . . ." education, for instance? There is still some truth in this. The Turks have a *flair* for charitable educational foundations, which they manage very well. Unfortunately, Turkey has in most respects stood still, or retrogressed, during the past century, whilst other nations have advanced by leaps and bounds. As to toleration, says Byron, what about Ireland? There were any number of Greek and Armenian colleges in Turkey, whilst we in England made a fuss about one Irish one. "But though they allow

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all this, they will not suffer the Greeks to participate in their privileges; no, let them fight their battles and pay their *haratch* (taxes), be drubbed in this world, and damned in the next."

He sums up in these words: "If it be difficult to pronounce what they are, we can at least say what they are not; they are *not* treacherous, they are *not* cowardly, they do *not* burn heretics, they are *not* assassins, nor has an enemy advanced to *their* capital." But this untoward event has happened three times in the last hundred years, during which Turkey has, in fact, gone to pieces, in more senses than one.—Yet many—perhaps most—Englishmen will agree with Byron's estimate.

Sympathy with certain sides of the Turkish character tempts some of us to forget its worst aspects, such as their unfortunate propensity for massacring subject races. We overlook the vicious and corrupt Ottoman adminstration. We feel that with such qualities, and with so rich an inheritance, a Turkey properly guided and instructed, ought to be great and prosperous. As it is, what has she to show? Mainly a record of utterly incompetent rule, punctuated by atrocities. She has not a single great name in art or science to her credit, nor one that the world remembers as its benefactor. What has your amiable Turk to say to this? A year or two ago, they would have shrugged their shoulders, and turned up their eyes and hands, with that half-comical, expressive gesture of pure negation, that is so entirely Turk, and said "We do not pretend that our methods have been the best. The people are ignorant and savage. You, who know so well how to order and govern, in every corner of the world *show us how to do it. We should like nothing better.*"[1] Their present hostility is skin deep. The frothy spokesmen of Angora, fresh from foreign universities, the smart, ambitious, young officers from *écoles de guerre*, do not represent the quiet, slow-thinking peasants of the uplands of Asia Minor.

In spite of recent events in India and Egypt, many Turks still admire our management of backward races (among whom they are

[1] I am tempted to quote another curiously similar passage from Aubrey Herbert's "*Ben Kindim.*" He represents the victorious Young Turks as saying after the revolution of 1908, "We have aspirations, but we have little knowledge and we have no experience. We must have a helping hand and we would prefer the hand of Great Britain. You have governed India and Egypt justly and honourably and to the advantage of these countries. Help us."

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quite ready to class themselves). They are more inclined than any of our European rivals to make allowances and find excuses for our mistakes. They know how to appreciate our difficulties, and they certainly do not attach too much importance to the revolutionary ebullitions of the past few years. The Turk is not hypercritical, and he knows that his own methods do not err on the side of gentleness. His educated criticism is that we fail here and there because we ride with too light a rein; but at the same time he is ready to admit that *he* fails for the opposite reason, where *we* might have succeeded. The official attitude at Angora is one of aggressive jealousy. They are suspicious and afraid of England. But the average Turk is quite well disposed to us. The poorer classes and the minor officials like our methods wherever we are in contact with them. The more educated think of us regretfully as their natural friends—"*amis séculaires*" as I have often heard them express it. It may be argued that they show this in a curious way, when their leaders avow their hostility to us, and are ready to practise what they preach by open warfare. "*Amantium irae*"! The Turk does not think overmuch of a little friendly blood-letting. To him war is a surgical operation, and the sword is the drastic lancet of diplomacy. Even pin pricks are better than nothing. The Osmanli is an anachronism, a relic of the middle ages, left stranded on the confines of a Europe which he does not understand, among peoples whom he has not assimilated. Turkey in Europe has been, in fact, simply an armed occupation prolonged through five centuries.

Forty years ago, Lord Salisbury, abandoning his earlier antipathy, reverted to our traditional policy of friendly regard for Turkey, and laid the foundations of a lasting British influence, working only for good, by the appointment of a number of vice-consuls, scattered over the Turkish Empire. This policy was uprooted by his successors, but there are still grey-bearded Turks living in remote villages of Asia Minor who remember, with regret and affection, the British officers of those days, and who, even now, look forward to a day when our agents shall again be there, to temper mis-rule, and help in the administration of the country.

What of the Greeks?

It is a century since Byron died. Kinglake wrote "Eothen"

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some eighty years ago. But the Greek temperament has changed little in essentials. The events of the past century have, rather, confirmed this diagnosis. What is a century in the history of immortal Greece? The people are still struggling, half swept off their feet, in the turbulent invigorating waters of liberty and independence which were once their element, but which left them for so long stranded high and dry. They shout and splash near the shore, but they have yet to learn to follow boldly in the wake of a leader such as Venizelos.

The Greeks and Turks of to-day live no less vividly in Kinglake's than in Aubrey Herbert's delightful pages. In Kinglake's opinion there was "more heartiness, and strength in the Greeks of the Ottoman Empire than in those of the new kingdom—the truth is, that there is a greater field for commercial enterprise, and even for Greek ambition under the Ottoman sceptre, than is to be found in the dominions of Otho. Indeed, the people by their frequent migrations from the limits of the constitutional kingdom, to the territories of the Porte, seem to show that, on the whole, they prefer 'groaning under the Turkish yoke' to the honour of being 'the only true source of legitimate power' in their own land." . . . Kinglake's sympathies are with the Hellenic people. But, "as the Greeks, poor fellows! happen to be a little deficient in some of the virtues which facilitate the transaction of commercial business (such as veracity, fidelity, etc.), it naturally follows that they are highly unpopular with the European merchants. . . . . Therefore you must be prepared to hear an almost universal and unbroken testimony against the character of the people, whose ancestors invented Virtue. And, strange to say, the Greeks do not attempt to disturb this general unanimity of opinion by any dissent on their part. . . . ."

Then follows a chapter on "Greek Mariners," which is so amusing, and, is, indeed, so symbolical of the Greek management of the Ship of State, and all its minor craft, that I venture to quote from it at some length.

Kinglake undertakes a cruise along the coast of Syria. The first care of the Greek Rayas is to sail under a foreign flag, and so the ship "enters upon the ocean with a flaming lie at her peak." . . . . "They choose a captain to whom they entrust just power

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enough to keep the vessel on her course in fine weather, but not quite enough for a gale of wind; they also elect a cook and a mate; the cook whom we had on board was particularly careful about the ship's reckoning, and when, under the influence of the keen sea breezes, we grew fondly expectant of an instant dinner, the great author of pilafs would be standing on deck with an ancient quadrant in his hand, calmly affecting to take an observation. But then to make up for this, the captain would be exercising a controlling influence over the soup, so that all in the end went well." Unfortunately in politics, either the soup or the ship's course are likely to go wrong, and it is the crew that finds itself in the soup.

The mate was a Hydriot, "fierce and gloomy, and lonely in his ways," one of whose principal duties seemed to be "that of counter-captain, or leader of the opposition." Presently they are in for a storm. "But where were the crew? It was a crew no longer, but rather a gathering of Greek citizens:—the shout of the seamen was changed for the murmuring of the people—the spirit of the old Demos was alive. The men came aft in a body, and loudly asked that the vessel should be put about, and that the storm be no longer tempted. Now, then, for speeches:—the Captain, his eyes flashing fire, his frame all-quivering with emotion . . . . pours forth the eloquent torrent of his threats, and his reasons, his commands, and his prayers: he promises—he vows—he swears that there is safety in holding on—safety, *if Greeks will be brave!*" . . . The storm increases. "The fierce Hydriot advances one step nearer to the Captain, another angry growl of the people goes floating down the wind, but they listen—they waver. . . . Brave thoughts winged on Grecian words gain their natural mastery over Terror: the Brigantine held on her course, and reached smooth waters at last." Happy omen! The parable awaits fulfilment.

Nor had Byron any illusions about the Greek character. The Childe Harold of 1809 had not changed when he started on the expedition of 1823 which ended in his death. One is left with the impression that although, after a good deal of consideration he might condescend to die for Greece, yet he would have preferred to have spent his last days amongst Turks. There was something pathetic, and at the same time a little ridiculous—he was quite ready to admit it—in his association, under the limelight, with a people

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whom he at heart despised, but whom he forced himself to serve from a purely intellectual sense of duty. As with Kinglake and many present-day Hellenists, it was the glamour of ancient Greece that drew Byron towards her degenerate sons. Napier, the fiery conqueror of Scinde, loved the race. They could not believe that no spark of the old fire glowed in Hellenic breasts. The dying embers could be rekindled. They found justification for their faith, and learnt to appreciate what was best in the modern Greek. Beneath the light and pleasure-loving surface of temperaments that seemed incapable of deep feeling, there lay finer susceptibilities, that could yet be stirred into action. The sense of shame and degradation in defeat and servitude was not dead. The cup of Samian wine could still be drained.

Shortly before his death Byron wrote: "When the limbs of the Greeks are a little less stiff from the shackles of four centuries, they will not march so much as if they had gyves on their legs. At present the chains are broken indeed; but the links are still clanking, and the Saturnalia is still too recent to have converted the Slave into a sober citizen. The worst of them is that (to use a coarse but the only expression that will not fall short of the truth), they are such damned liars; there never was such an incapacity for veracity since Eve lived in Paradise."It is a century later. The chains should no longer clank, for the last of the prisoners have been driven out against their will. But the stiffness has not worn off, and Greeks have not even yet learnt to use their limbs as free men.

Such passages give a very true description of the modern Levantine Greek character. Every traveller to the Near East knows what to expect. He is warned by the guide books, the residents, the busniess men, the Greeks themselves. They are considered sharp, shifty, and unreliable in business; inclined to be flashy and suspicious, on the look-out for imaginary slights—the exact opposite of the imperturbable Turk. It is an attitude of mind which does not inspire respect. They have no particular affinity to the British; rather, an absence of understanding and sympathy, natural to such widely different races. But they have the good qualities of their temperament—quickness—enthusiasm—devotion to a cause. They reached the highest summit of human greatness. They have been

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a light to the world. They fell. Under the heel of the Ottoman they underwent, for nearly five centuries, humiliations and persecutions that would have killed a spirit at heart less indomitable. The War came; in the end they showed themselves men. Tardily, perhaps, they had taken up, and were struggling to lift once more, the torch that fell from the hands of their forefathers. But, betrayed at home, and deserted by their Allies abroad, they failed. They still deserve the respect and encouragement of all lovers of freedom.

But what constructive policy had Greece to put forward? Little more, as far as one could judge, up to the time of her defeat, than an armed Greek occupation, supported by the Allies, of all disputed Ottoman territory. As Kinglake said, always "a flaming lie at her peak." Up to the end, it was common knowledge that many of the Ottoman-Greek districts preferred a Turkish to a Greek mis-rule. Recriminations can be overdone. Turkish and Greek vision is peculiarly liable to be obscured by motes and beams.

Yet, whatever may be one's feelings towards a certain class of commercial Greek or Armenian—and opinions are unanimous—nobody can fail to admire the steadfastness with which both these races have retained their religion and their nationality during centuries of oppression. A word could have secured for them and their descendants all the rights and privileges and immunities of a Mussulman—not only the doubtful blessings of an "Ottoman subject." They would have escaped untold persecution, massacre and deportation. Yet they did not say that word, but remained followers of Christ. And those who suffer, or have suffered, are as much martyrs as any who have undergone death or persecution for their faith.

Many nationalities besides the Greeks are—or were—included among Ottoman subjects. Under the new Turkish régime thousands of them have left the country of their birth or their adoption. The case of the Armenians is not dissimilar to that of the Greeks. Their claims are no less strong, their treatment no less brutal. Gibes are flung at them. It has been said that the Turk is always ready to fight with all his neighbours, and that the first impulse of anyone in the neighbourhood of an Armenian, is to maltreat him; so there you have a situation with only one

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possible *dénouement*. But these taunts are unfair. No one can deny that the Armenians are an industrious and pertinacious race, deserving of encouragement and protection. The fact remains that the Turks have always relied, and still rely, greatly on their talent for business; they are already regretting their loss.

The Jews have never been victimized as much as other Levantine aliens under Ottoman administration—an unusual experience for them, perhaps. They have repaid it by acquiring a reputation as fair and honest traders, in favourable comparison with most of the other "Dagos." Orientals proper have also suffered, or have minded suffering, less, at Ottoman hands.

As for the European and American Christians, they are better able to look after themselves, but they too have laboured under many disabilities, not to say persecutions, accentuated under the present administration, and increased with the abolition of the Capitulations. The large and powerful colonies of wealthy and cultivated foreign residents have been greatly reduced.

This new sabre rattling, loud-talking Turkey proclaims that she will brook no meddling in her internal affairs. But it is not the least melancholy reflection that a reversion to Turkish mis-rule is the worst that can befall Turkey herself—not only her unhappy Ottoman subjects of alien race. This view is, I believe, even now shared by a great inarticulate body of sober-thinking Turks. Their voices are drowned in the noisy shouting of braggart leaders, many of them no more true Turks than Enver and his like. This handful of men with a veneer of European education does not represent the soul of Turkey. The real Osmanli, grave and patient, "the unsophisticated Moslem," whom Mustapha Kemal Pasha has himself described as the only true master of Turkey, wants peace and orderly government, not words and wars. The Ghazi is a great leader and a patriot; Angora is full of noble sentiments. But whither are they leading?

As we have seen, Enver and Talaat, who had some good in them, and plenty of ability, saw that the best hope for Turkey was a united Ottoman population, sinking religious and racial differences—"under one blue sky, proud to be Ottoman." They might have helped to achieve this fine aspiration, but their judgment was at fault, and they had no fixed principle. Their "flowery

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revolution," with its charming ideals and pretty phrases, the "beautiful brotherhood" of the C.U.P., all quickly withered away, and left a barren waste where Paradise had seemed to be so near. They looked to England—in vain. They threw in their lot with Germany, a gambler's chance, and went to unmerited perdition.

What hope for the future? Perhaps the best hope lies in a return to the diplomacy of the past. In spite of some outward symptoms of hostility, Turkey is still, at heart, not less friendly to England than to any other Power. When the present frenzy has had time to die down, if we hold out a hand to help her, instead of meeting her with a mailed fist—or worse still, with the velvet *hand* in the iron *glove*—Turkey will in time prove reasonable. She knows the meaning of the "Ottoman blight." She has no natural gift for government, and no instinct for progressive development. A nation of soldiers, farmers and government officials cannot be turned all at once into traders. The latter were found among the oppressed Greeks, Armenians and Jews. But unfortunately all alien enterprise is regarded with suspicion by the Turkish Government. I have already given, for what it is worth, the old Turkish point of view. "Come and help us. We should like nothing better." Such would have been her appeal to the Allies, especially to England, in 1918. And such it may yet be again.[1]

Let us follow the lead Lord Salisbury gave, and try to re-establish the influence we held in the days of the great *Elchi*—Ambassador *par excellence*—Stratford Canning, Viscount Stratford de Redcliffe (1786-1880). It is a fine ideal—a regenerate Turkey with England as her most trusted ally. But nowadays we are afraid of "entangling commitments." This is not the moment for Crusades. Enterprise that is not purely commercial is labelled "adventure," and pioneers are "adventurers" or "jingoes"; so, I suppose, were Raleigh and Clive and Gordon, Chatham and Pitt. We are no longer ready to hew a way. We must see our goal—a bag of gold at the end of a turnpike road. We dare take no risks, unless

[1] Talaat himself, then an exile in Germany, told Aubrey Herbert in 1921, that the hostility to England was only political. The Turkish proverb says "Eski Dost Dushman olmaz," (an old friend can never be an enemy). The last words Herbert wrote in June, 1923, were: "The Turk is a lonely man and he desires friends, but the only people with whom he has an affinity are the British. Are we, or are we not, going to take the hand that is stretched out to us?" See also the two previous quotations from *Ben Kendim*.

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they are duly covered by insurance, securities and guarantees deposited. The answer to this is, that the potential wealth and possibilities of Asia Minor are in themselves a sound security, under a stable and progressive government. A settled Turkey is as essential to the welfare of Europe as to Asia, and the New Republic will need the assistance of some great and friendly Power to secure it. There need be no danger of compromising the jealously guarded "independence" and "sovereignty" of Turkey, for which the glib gentlemen of Angora are so concerned. With England her ally, they would be guaranteed.

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ROYAL ARTILLERY WAR MEMORIAL.

UNVEILING AND DEDICATION CEREMONY.

By Major-General Sir Stanley von Donop, K.C.B., K.C.M.G.,
Colonel Commandant, R.A.

ON Sunday, October 18th, in the presence of a large gathering fully representative of the whole Regiment, past and present, the War Memorial, erected to the memory of those of all ranks of the Royal Artillery who gave their lives in the Great War, was unveiled and dedicated.

It was with much gratification that the Regiment learnt that Field Marshal H.R.H. The Duke of Connaught had graciously consented to unveil the Memorial. It will be remembered that the Memorial in St. James' Park to those of our comrades who fell in the South African War 1899-1902 was also unveiled by His Royal Highness.

The Duke's early connection with the Royal Artillery is illustrated by the photograph facing p. 481 and taken in 1868 showing His Royal Highness with the officers of the battery in which the Prince was then serving as a subaltern.

Rain fell in the early morning but soon after nine o'clock the clouds lifted, the sun came out at intervals, and for the rest of the day the weather was everything that could be wished for considering the time of the year.

It was a truly remarkable sight that met the eye between 10 and 11 o'clock. In place of the usual turmoil of traffic which one is accustomed to see at Hyde Park Corner, the whole of the space comprising the three "islands" was enclosed and filled with some six thousand men, women and children, all of whom were connected in some way or another with the Regiment. Headed by the Colonels Commandant, twenty-two of whom were present, large numbers of every rank from General down to Trumpeter were among those assembled in the enclosure. Most of them were in service dress and, with the exception of those still on the active list,

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they and those in plain clothes wore the medals and decorations bestowed on them for their services in the recent and former wars. Added to those who had actually served was a large number of relatives of Gunners of all ranks to whose memory the Memorial has been erected.

Among those present were to be seen the Secretary of State for War, accompanied by the members of the Army Council; the Home Secretary, General Sir Ian Hamilton and other distinguished generals who commanded armies in the Great War; the High Commissioners of the Dominions; the Military Attachés of the Allied Forces, and again the Countess Roberts and Lady Edwina Lewin, Lady Brackenbury, Lady Sclater and Lady Noble, names which will be honoured for all time in the annals of the Royal Artillery. A more comprehensive list is given at the end of this article.

The distinguished visitors were received by Maj.-Genl. M. H. Saward, the senior Colonel Commandant present, in the regrettable absence of General Sir E. Chapman, the Master Gunner, St. James' Park, who was prevented by illness from attending.

Prominent at various positions in the enclosed space were:—

A representative body of Gentlemen Cadets from the Royal Military Academy; blinded men from St. Dunstans; disabled men from the Star and Garter Home and from Roehampton; Warders from the Tower of London; Gunners from the Royal Hospital, Chelsea; the sons and daughters of Artillerymen from the Duke of York's School, the Royal Soldiers Daughters' Home and the Royal Patriotic School, it being noted with interest how each girl of the two latter institutions wore with pride the badge of a gun to show her connection with her father's Regiment.

The 13 pr. gun belonging to "L" Battery, R.H.A., with which, during the retreat from Mons, such a heroic stand was made at Néry against the overwhelming fire of the advancing Germans, was drawn up in a prominent position.

A Guard of Honour, commanded by Capt. C. H. Lloyd and consisting of two officers and 100 men found by the Royal Artillery Depôt, Woolwich, and the Regimental Band were drawn up in front of the Memorial while the choir of St. George's Garrison Church, Woolwich, was also present to lead the singing of the Hymns.

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General Sir Leslie Rundle inviting Field Marshal H.R.H. The Duke of Connaught to Unveil the Memorial.

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Colonel V. Asser was in command of all the troops present on parade.

Loud speakers were installed so that all present, not only in the enclosures but standing in the crowds outside, heard clearly the service of dedication and the speeches of His Royal Highness and Sir Leslie Rundle.

From 11 o'clock onwards the Band played the following selections:—1. Marche "Héroïque," Saint-Saëns; 2. Overture "Stabat Mater," Rossini-Mercadante; 3. "Judex" from "Mors et Vita," Gounod, these being followed by three verses of Kipling's Recessional hymn sung by the choir and in which all spectators joined.

A few minutes later the "General Salute," sounded by the massed Trumpeters of the Regiment, announced the approach up Constitution Hill of Field Marshal H.R.H. The Duke of Connaught who was met on arrival by General Sir Leslie Rundle, President of the Royal Artillery War Commemoration Fund, and received with a Royal Salute by the Guard of Honour. After inspecting the Guard of Honour and after greeting Maj.-Genl. M. H. Saward, His Royal Highness proceeded to the dais close to the Memorial and was invited by General Sir Leslie Rundle in the following words to unveil the Memorial:—

"In the name of the Regiment and as President of its War Commemoration Fund I ask your Royal Highness to unveil this our Memorial.

The Regiment has always remembered with pride the days that your Royal Highness spent at the Royal Military Academy and whilst serving in the 62nd Field Battery, R.A., as an officer of the regiment.

The Memorial is to the memory of those of all ranks of the regiment—regular, special reserve, territorial and new armies—who gave their lives during the Great War.

At the close of the war a considerable sum of money was raised and in order to meet the wishes of the majority of the subscribers it was decided by a Committee composed of all ranks to set aside not more than 12% of the amount received for a permanent Memorial in London, the remainder to be used for benevolent purposes.

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In carrying out this latter task, some £90,000 has been expended since July, 1919, on ex-artillerymen, their wives, widows, orphans and dependents, in providing (1) relief in the form of money or clothes, (2) education—in each case up to the standard that would have been available for the children if the fathers had not suffered through the war, and last but by no means least in finding employment.

Funds still in hand are sufficient it is hoped to enable this work to be continued for another twenty or thirty years. Since the date mentioned over 12,000 cases have been helped by the Relief Committee, grants to assist the education of over 700 children have been made, while during the year 1924 alone, employment was found for over 1,744 men.

Further, touch is kept with ex-artillerymen all over the Empire by means of nearly 700 Gunner Friends, one of whom can be found in almost every locality in the British Isles and through whom applications for assistance can be made."

His Royal Highness then gave the following address:—

"I am especially gratified to have been asked to unveil this monument, having had the honour of serving as a Gunner in the regiment during the years 1868 and 1869.

The War Memorial, which I am about to unveil, is, as you have heard, but a small part of a greater memorial founded by the regiment in grateful memory of those who gave their lives for King and Country in many lands during the Great War.

On the 4th August, 1914, the strength of the Royal Artillery was 4,083 officers and 88,837 other ranks, divided up amongst 290 regular and 264 territorial units. By the 11th November, 1918, the figures had become 29,990 officers, 518,790 other ranks and 1,796 units.

During the progress of the war the Territorial Artillery was incorporated with the Royal Regiment of Artillery and has worthily upheld the great traditions of the Regiment of which it now forms an integral part.

Over 888,000 of all ranks passed through the Regiment between the years 1914-1918.

Of this number, 49,076 were killed in action, or died, 129,156 were wounded, and 6,689 were reported missing, making their

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losses a total of 184,921, or nearly twice the size of the artillery, regular, special reserve and territorial, at the commencement of the war, and 25 per cent of the total number serving.

The following is a list of the decorations gained by artillerymen in the late war :—

VICTORIA CROSS	18
D.S.O.	1118
MILITARY CROSS	3187
D.C. MEDAL	2602
MILITARY MEDAL	14581

This does not include a great number of foreign decorations, which were bestowed upon those serving in the regiment.

The Royal Regiment of Artillery can indeed look back with pride to their splendid record of service, when their guns were first heard of in the year 1314, though it was not until the year 1716 that the first two companies of Artillery were formed.

The Regimental Coat of Arms at the northern end of the Memorial bears the mottoes "Ubique" and "Quo Fas et Gloria Ducunt"—a distinction given by King William IV in June, 1833, to take the place of all past or future battle honours and distinctions, gained in the field by the regiment, and the names which you will see carved round the Memorial merely indicate "theatres of war" in which the Royal Regiment of Artillery served.

Those to whose memory this Memorial, which I am about to unveil, is dedicated, died while upholding the spirit of these mottoes, and to future generations of the Royal Regiment of Artillery I say :—

'See to it ye that come after
That their names be not forgotten.' "

At the conclusion of the address H.R.H. proceeded to the corner of the dais and releasing simultaneously all the large flags forming the screen round the Memorial, unveiled the latter, saying at the same time in a distinct and reverent tone : "To the Glory of God and in honoured memory of the officers and men of the Royal Regiment of Artillery, who gave their lives in the Great War, I unveil this Memorial. "

There was a roll of the drums just prior to the act of unveiling and as the flags fell revealing the massive and imposing structure

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with the three prominent standing figures the Band broke softly into the National Anthem, all soldiers present standing at the Salute while a gleam of sunshine shone with great effect on the whole scene.

The Chaplain General of the Forces, the Revd. A. C. E. Jarvis, then proceeded to the steps in front of the Memorial and dedicated it with these words:—

"To the Glory of God and in grateful memory of those who gave their lives for King and Country and a Righteous Cause, I dedicate this Memorial, in the name of the Father, and of the Son, and of the Holy Ghost. May all who look upon it realise the peace of sins forgiven; the joy of faithful service, and the power of the endless life, to which may God vouchsafe to bring us all; through Jesus Christ our Lord. Amen."

This was followed by a short service with appropriate prayers, in which the Revd. O. S. Watkins (Deputy Chaplain General) and the Revd. F. J. Walker, Senior Chaplain at Woolwich, took part. The service was brought to a conclusion with John Arkwright's beautiful hymn "The Supreme Sacrifice," which was sung by all present.

Then came what was considered by many as the most impressive part of the ceremony. It began by a triple roll of the drums scarcely audible at first but gradually swelling in volume and then, in a similar manner, dying away. Then was heard from the direction of the Palace the "Last Post," bringing to the minds of all "the close of Life's Day," and as the last echo of the trumpets died away, all remained still and maintained a reverent silence for a brief space—at this moment, all traffic having been stopped, there was a silence which must have been really felt by every soul in the neighbourhood. At the termination of this act of homage to our departed comrades there was a further roll of the drums preceding the Royal Artillery Regimental call—which call was answered by a flaring note of final triumph as the Reveillé, symbolical of "the awakening to Eternal Life" rang out—it seemed almost from the skies—given with striking effect by 80 trumpeters massed high above everybody on the roof of St. George's Hospital.

General Lord Horne, the senior Colonel Commandant on the active list, now deposited a wreath at the foot of the Memorial on

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behalf of ALL RANKS of the Regiment (Regular, Special Reserve, Territorial and New Armies) "in proud remembrance of their honoured dead."

While this act was being performed the Band was heard playing very softly a few bars of an *Andante* by Beethoven.

The wreath, which was seven feet in diameter, was composed of laurel with bands of red roses and sprigs of rosemary inserted for remembrance. The badge on the inscription attached to the wreath was taken from the remains of an unknown Artilleryman, found on one of the battlefields of France. The card was framed in wood from broken crosses found on the graves of Artillerymen whose bodies have been removed to consecrated ground. The badge at the top of the frame was from the tunic of an officer killed while fighting his guns in action.

The gun of "E" Battery, R.H.A., on which the wreath was brought up was the one from which the first (British) shell of the Great War was fired on August 22nd, 1914, and at which the first casualty among the gun detachments of the Regiment occurred. The pair of horses in the lead of the gun team went out to France with the original Expeditionary Force in August, 1914, and served throughout the war. It is hoped that steps will be taken by the Regiment to buy these horses, which are now due for casting, so that it may be ensured that their old age may be spent in comfort and repose.

The small party assisting Lord Horne with the wreath consisted of a Tower Warder, a Chelsea Pensioner, one Territorial gunner and two boys from the Depôt, thus being fully representative of the Past, Present and Future. It may be mentioned in connection with the Tower Warder, Mr. Little, that his father, two uncles, brother, as well as he himself, served in the Regiment, while two nephews and his only son are still serving the guns—a family record it would be hard to beat. The Chelsea Pensioner, Sergt. Thomas, too, will be remembered by many of the senior officers, as one of the staff at the R.M. Academy from the year 1877 onwards, and from whom they learnt their first rudiments of drill.

After a final roll of the drums and the Slow March of the Royal Artillery had been played by the Band, the Chaplain General pronounced the Benediction.

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The sculptor, Mr. C. S. Jagger, the architect, Mr. Lionel Pearson, and the contractor, Mr. Wallis, were presented to the Duke of Connaught, who then left the dais and proceeded to inspect all four sides of the Memorial, taking opportunity at the same time to extend a greeting to each of the military attachés as well as to a number of the distinguished ladies and gentlemen present, after which His Royal Highness took his departure amid a Royal salute from the Guard of Honour.

Opportunity was then given for the laying of wreaths and flowers.

The first of these wreaths was deposited by General Sir George Milne, Colonel Commandant, Royal Artillery, on behalf of all ranks of the Royal Regiment of Artillery, "in treasured memory of our comrades of the Artilleries of the Great Overseas Dominions, who fought in close comradeship, and died side by side with us in the Great War." As soon as this wreath was laid in its place all present joined in singing the first verse of the National Anthem.

Representative parties carrying wreaths from Units and Associations now moved forward to the Memorial and in succession deposited their tributes. Particularly touching was the spectacle of some fifty blinded men approaching to present their own token. The units and associations were followed by an apparently endless procession of widows, orphans and other relatives, all wishing to place on the Memorial either a wreath, bunch of flowers or even a single blossom in remembrance of loved ones. This almost constant stream lasted until quite late in the afternoon.

Everyone present appeared to be much impressed with the way the ceremony was carried out and the Regiment has reason to be well satisfied with the careful arrangements that had been made to ensure its success. When it is realised that the Memorial is at a place where there is much traffic and that consequently the roadways surrounding the "islands" could only be blocked for an hour and a half during which time in addition to the actual ceremony and the arrival and departure of the spectators, some 1400 chairs had to be placed in position and removed, it will be seen that a special word of appreciation is due to those responsible, especially to Maj.-Genl. Sir Herbert Uniacke, Brig.-Genl. F. T. Ravenhill,

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Lt.-Col. A. H. Webb and the Staff at Artillery House—all those mentioned had taken immense trouble during the last few months to ensure that no detail should be overlooked. Tribute is also due to Sir Lionel Earle and the Staff of the Office of Works, the Chief Commissioner and members of the Metropolitan Police, the Curator and Staff of the Imperial War Museum, the St. John's Ambulance Brigade, the British Red Cross Society and the Choir of St. George's Garrison Church, Woolwich, for their assistance and hearty co-operation, and in addition to the Wellington Club and St. George's Hospital for their kindness in placing accommodation at the disposal of the Committee for those unable to sit or stand in the open, while the generosity of Mr. Shanly in giving some 1500 park chairs free of charge was also much appreciated.

It will not be thought out of place to refer to the reverent demeanour of the vast crowds and passers-by outside the reserved spaces. It was obviously impossible for the main traffic to be stopped except for a few minutes at the time of Dedication but it was very noticeable how, during the whole ceremony, all those travelling by omnibus stood up with bared heads as they passed, while the drivers and conductors showed their respect by saluting.

For the convenience of relatives, arrangements were made for having three florist's stands, owned by those connected with the artillery, so that wreaths and flowers could be readily obtained by those wishing for them.

Copies of the order of ceremony were previously circulated to all Artillery stations so that a similar service could, if wished, be held locally.

It is impossible to give a complete list of all those present but the following were among those who attended and who were, in most cases, accompanied by their wives or relatives.

Guests of the Royal Artillery.

The Secretary of State for War, General the Earl of Cavan, Lieut.-Genl. Sir Robert Whigham, Sir Herbert Creedy, The Home Secretary, General Sir Ian Hamilton, General Sir Archibald Murray, General the Right Hon. Sir John Maxwell, General Sir Hubert Gough, The Right Hon. Sir Joseph Cook, High Commissioner for Australia, The Hon. Sir James Allen, High Commissioner for New Zealand, Lieut.-Col. Crerar, representing the High Commissioner for Canada, Mr. J. Smit, High Commissioner for S. Africa.

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Military Attaches.

Belgium	Major Henry G. Nerincx.
France	Général de Brigade Desprès.
Italy	Lieut.-Col. Amerigo Coppi.
Japan	Major-General Harushige Ninomiyo.
Roumania	Colonel Ion Antonesco.
Czecho-Slovakia	Lieut.-Col. Frantisek Joseph Nemec.
Serbs, Croats & Slovenes ...	Colonel de l'Etat-Major Georges Ostoïc.

The Countess Roberts, Lady Edwina Lewin, Lady Sclater, Lady Brackenbury, Lady Noble, Lady Hadden, Mrs. Frederick King, Mrs. Malcolm Peake, Maj.-Genl. J. R. E. Charles, The Chairman and Secretary of the L.C.C., The Mayor of Westminster, The Chief Commissioner of the Metropolitan Police, Lord Lawrence, Sir A. Grey, Sir Charles Parsons, Sir George Buckham, Maj.-Genl. Sir Francis Bond, Col. R. C. Temple, Sir James Bell, General Gascoigne, Rear Admiral Crooke, Maj.-Genl. W. Cavaye, Lieut.-Col. Sir Arthur Leetham, Major C. Ffoulkes, Rev. E. Pulling, and Mr. Courtenay Welch.

Officers of the Regiment.

Colonels Commandant.

Maj.-Genl. M. H. Saward, General Sir H. M. L. Rundle, Maj.-Genl. Sir D. D. T. O'Callaghan, General Sir F. R. Wingate, General Lord Horne, General Sir G. F. Milne, Lieut.-Genl. Sir A. Hamilton Gordon, Lieut.-Genl. Sir J. P. Du Cane, Lieut.-Genl. Sir A. E. A. Holland, Lieut.-Genl. Sir W. T. Furse, Lieut.-Genl. Sir J. F. N. Birch, Maj.-Genl. Sir J. Leach, Maj.-Genl. J. C. Dalton, Maj.-Genl. Sir J. M. S. Brunker, Maj.-Genl. R. Bannatine-Allason, Maj.-Genl. Sir J. K. Trotter, Lieut.-Genl. Sir H. S. Jeudwine, Maj.-Genl. H. B. Jeffreys, Lieut.-Genl. Sir E. A. Fanshawe, Maj.-Genl. Sir W. F. L. Lindsay, Maj.-Genl. T. S. Baldock, Maj.-Genl. Sir S. B. von Donop.

Colonel Right Hon. Lord Stamfordham, Colonel Right Hon. Lord Lee of Fareham, Colonel the Earl of Denbigh.

Lieut.-Genl. Sir John Keir.

Major Generals E. W. Alexander, V.C., Hon. Sir F. R. Bingham, Sir C. E. Callwell, T. A. de Moleyns, Sir J. E. W. Headlam, Sir W. E. Ironside, J. T. Johnston, Sir G. V. Kemball, B. R. Kirwan, Sir G. F. MacMunn, A. A. McHardy, Sir H. F. Mercer, Sir A. W. Money, Sir A. A. Montgomery, Sir R. A. K. Montgomery, W. J. Napier, Sir W. H. Onslow, Sir E. M. Perceval, H. L. Reed, V.C., Sir A. B. Scott, Sir H. Guthrie Smith, Sir W. Thwaites, Sir H. C. C. Uniacke, H. D. O. Ward, G. H. A. White.

Brigadier Generals B. M. Bateman, R. P. Benson, H. M. Campbell, J. A. Coxhead, C. Cunliffe-Owen, A. C. Currie, H. S. Dawkins, W. Evans, R. Fitzmaurice, R. H. Hare, E. S. Hoare Nairne, C. St. M. Ingham, L. D. Jackson, R. M. Johnson, H. E. T. Kelly, E. A. Lambart, J. E. C.

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Livingstone-Learmonth, H. J. A. Mackey, G. H. W. Nicholson, J. S. Ollivant, F. R. Patch, H. de T. Phillips, E. J. Phipps-Hornby, V.C., Lord Playfair, C. Prescott-Decie, F. T. Ravenhill, W. A. Robinson, W. B. R. Sandys, W. C. Savile, Hon. W. D. Sclater-Booth, H. S. Seligman, C. G. Stewart, J. W. Stirling, H. E. Stockdale, A. Stokes, R. A. C. Wellesley, G. F. White, W. L. White, T. B. Wood.

Colonels A. G. Arbuthnot, H. F. Askwith, V. Asser, A. M. Balfour, W. H. Bartholomew, J. E. S. Brind, W. M. Campbell, C. W. Collingwood, A. S. Cotton, H. S. de Brett, F. F. Ditmas, K. S. Dunsterville, A. E. Erskine, Sir W. Y. Foster, D. H. Gill, Lord Douglas Graham, W. F. Graham, E. F. Hall, J. C. Hanna, K. E. Haynes, E. A. P. Hobday, A. J. Hughes, J. R. J. Jocelyn, C. A. Ker, H. F. E. Lewin, C. F. Liardet, W. N. Lloyd, J. F. R. N. Maitland-Addison, R. W. Rainsford-Hannay, W. C. Phillips, H. Rouse, A. S. Pratt, H. F. Salt, C. N. Simpson, H. C. C. D. Simpson, Hon. G. F. Stanley, H. C. Stanley-Clarke, W. Stirling, A. Swinton, H. L. Tennant, C. C. Trench, A. H. Webb, M. L. Wilkinson, G. Wright.

Lieut.-Colonels W. H. Barrell, A. K. Main, T. C. W. Moloney, M. Muirhead-Murray, R. C. Williams.

Majors P. G. Godfrey-Faussett, J. C. McGrath, H. S. Marshall, J. Martin, H. P. Oakley, P. Turnbull.

Captains W. B. Carter, W. Philpotts, H. J. Rice, P. G. E. Warburton.

Description of the Memorial.

Before describing the Memorial itself it may be of interest to hear of the steps taken by the Committee entrusted with the duty of the selection and approval of the design.

The Central Committee consisting of 55 members of all ranks from General to Gunner, was formed in 1918 with the late General Sir Henry Sclater as President, Lieut.-Genl. Sir William Furse, Vice-President, Colonel Wilford Lloyd, Hon. Secretary, and Major E. H. T. Parsons, Hon. Treasurer. In 1919 Brig.-Genl. F. T. Ravenhill took over the duties of Secretary and in 1920 Maj.-Genl. Sir Stanley von Donop those of Hon. Treasurer.

In September, 1923, on the lamented death of Sir Henry Sclater, who had so successfully organised from the start the various branches for carrying out the benevolent work of the Fund, and who in addition had so carefully guided and helped the committee in their selection of the most suitable design for the permanent memorial, General Sir Leslie Rundle was unanimously elected to the office of President.

The specification given to the sculptor was for "a sculptured group in bronze on a suitable pedestal, such as will be unmistakably

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recognisable as an Artillery Memorial to any gunner or layman of ordinary intelligence, immediately it comes within his view.

It should be remembered that during the War and for many years before it, the Royal Regiment of Artillery was divided into two branches, viz. :—(1) Royal Horse and Field Artillery; (2) Royal Garrison Artillery. The friendly rivalry of these two branches and the susceptibilities arising therefrom should be remembered by the Sculptor in thinking out the design."

The foregoing instructions carried out the wishes of a General Meeting held in July 1920 when a "Realistic Artillery Memorial" was unanimously agreed to.

On the 30th May, 1921, a meeting of the Sites Committee was held at Artillery House to consider two designs that had been prepared.

The Sites Committee consisted of :—

The Earl of Crawford, K.T., P.S.A., LL.D., First Commissioner of Works. (Chairman).

Sir Lionel Earle, K.C.B., K.C.V.O., C.M.G., Secretary, Office of Works.

The late Major-Genl. Lord Cheylesmore, K.C.M.G., K.C.V.O., representing the Westminster Borough Council.

Sir Reginald Bloomfield, R.A., LL.D., President, Royal Society of Architects.

Sir George Frampton, R.A., LL.D., F.S.A.

Mr. R. J. Allison, C.B.E., A.R.I.B.A., Chief Architect of the Office of Works.

This Committee after viewing the two models, unanimously approved the design of memorial submitted by Mr. Jagger, saying that it could, if selected, be suitably erected on the island site near Hyde Park Corner and expressing most favourable opinions on the design itself as well as on its relationship to the surroundings.

At a general meeting of the R.A. War Commemoration Fund held on June 28th, 1921, Mr. Jagger's design was accepted in principle. His Majesty the King, Colonel-in-Chief was graciously pleased to approve the design.

In this, the original design, the howitzer pointed eastwards, and there were only two bronze figures. Subsequently the howitzer at the suggestion of the artist, was turned so that it pointed over

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General Sir George Milne depositing a Wreath on Behalf of the Regiment
In Memory of the Artilleries of the Great Oversea Dominions.

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Hyde Park and a third figure was added. Again on the representation of the Fine Arts Committee (which had taken the place of the Sites Committee for this purpose) and on the strong recommendation of Mr. Jagger, approval was given for the howitzer to be turned so that it pointed in a southerly direction. Further modifications were subsequently made, the principal one of which was the addition of a recumbent figure, in bronze, of a dead artilleryman, to be placed at the north end of the memorial.

The changes mentioned all received the approval of the Central Committee as well as that of the Office of Works.

When looking at the Memorial it is interesting to know that Mr. Jagger in designing it aimed at the general form being symbolical of the force and power of the Artillery. In order to obtain this effect he used forms synonymous of strength, viz., a low squat and spreading base and a gun which is pyramidical in character. He wished also that the design should record the relentless power played by the gun in this war which was, more than ever before, a war of machinery.

The Sculptor also arranged the pose of the big figures so that they stand tight up against the background, and in one case with the arms resting on a stone ledge, thus obtaining a definite connection and feeling of unity between the bronze figures and the stonework behind them. He also deliberately selected quiet, semi-reposeful attitudes, so obtaining the calm quiet dignity and impressiveness which he considered big sculpture should always possess.

Then again Mr. Jagger considered that in order to obtain the most *monumental* effect it was necessary that either "stone" or "bronze" should predominate, and in his opinion stone, as indicated in the Pyramids, is much more *monumental* than bronze. Having arrived at this he felt it was better to make the great mass of stone a foil to set off the principal details of the design, that is, the four bronze figures. Thus by using bronze for the four figures only the main interest would be concentrated on them.

The Sculptor had other reasons for this decision, such as the fact that the dominant line is the ground rising in one direction while the line of the howitzer falls in the opposite direction, these lines converging to a common point form a connection with the

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earth and this would in his opinion have been entirely missed if there had been a change of material in the mass as the dividing line would have necessarily been horizontal. Again the figures being on the eye level and the howitzer raised some 20 feet, the latter, if of bronze, would have given the appearance of actual size while the figures were one third larger.

The Memorial consists of a platform and pedestal surmounted by a sculptured representation of a 9·2 inch. B.L. Howitzer, these features being executed in Portland stone. The dimensions of the pedestal are 45 feet long by 22 feet wide, while the muzzle of the Howitzer is about 37 feet above the level of the roadway.

At the south end of the pedestal is placed the figure of an Artillery subaltern and on the east and west sides respectively are figures of a Gunner (in his shirt sleeves) carrying up 18 pr. ammunition in carriers and a Driver sheltering himself with a waterproof sheet and holding in his hands his whip and horses' head gear. At the north end, over the spot where copies of the Roll of Honour and the Royal Artillery War Commemoration Book have been deposited, is the recumbent figure of a dead artilleryman, covered with his greatcoat and steel helmet, the face being almost entirely hidden. Beneath this form are the words "Here was a royal fellowship of death." All these four figures are in bronze and they are on a scale one-third larger than life size while the Howitzer on the top has also been given a similar enlargement. The Regimental arms, beautifully modelled and carved in stone, are immediately over the recumbent figure and around the top of the pedestal are set out the various theatres of war in which the Regiment was engaged.

On the four sides of the pedestal are carved in stone, bas-reliefs depicting incidents of the various branches of the Royal Artillery in action. On one side is seen an 18 pr. gun being manhandled into position and a 4·5 inch howitzer, while the wheel horses of a 13 pr. limber are seen in the background at the gallop, with their heads thrown up, the driver having been shot and reeling in his saddle. On another side two 8 inch howitzers are shown, camouflaged in a realistic manner, and with the layer and loading numbers carrying out their duties. A 6 inch howitzer is also seen and in addition a blinded gunner is being guided to the dressing station by

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a comrade who is also carrying a wounded man on his back. Conspicuous on the other portions of the pedestal are a signaller and telephonist, a 13 pr. gun and a Lewis gun both engaged against aircraft, a trench howitzer with a gunner observing through a periscope, while on two small spaces can be seen representations of a village shrine and a trench kitchen, the latter complete to detail even to the rum-jar on which are the well-known but mystic letters "S.R.D." Memories of the Flanders fields are also recalled by such signs as "Wind dangerous" and the cartridge case used to give warning of the approach of gas.

The designs in relief and the treatment of the figure work throughout are faithful interpretations of the conditions and peculiarities pertaining to service in the field in the Great War, and the greatest attention has been paid by Mr. Jagger, the sculptor, to all details, especially those of the equipments and uniforms depicted. The vertical bronze figures which are executed to the sculptor's usual bold and characteristic designs are typical of the ubiquitous subaltern, the indefatigable gunner and the driver devoted to his horses, while the recumbent figure (under the regimental arms) gives the finishing touch of an unknown "gunner" to what will surely become in days to come a place of homage and where many will place tokens of love and remembrance.

On either side of the Memorial over the heads of the figures there is the following inscription :—

IN PROUD REMEMBRANCE OF THE
FORTY-NINE THOUSAND AND SEVENTY-SIX
OF ALL RANKS OF THE
ROYAL REGIMENT OF ARTILLERY
WHO GAVE THEIR LIVES FOR KING
AND COUNTRY IN THE GREAT WAR
1914 — 1919.

The Memorial has now been handed over to His Majesty's Office of Works to whom also has been given a sum of money as an endowment, in return for which the Office of Works have undertaken to keep the Memorial for all time clean and in good repair.

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It will be easily understood how extremely difficult it was for any Committee to meet the wishes of all those concerned in the matter of a memorial such as this. As instances it may be remarked that there was considerable divergence of opinion regarding two features. It was thought by some that the names of the theatres of war should be omitted as they might be looked upon as "Battle Honours" in place of the word "Ubique" which the Royal Artillery were in 1833 authorised by H.M. King William IV to bear in lieu of all other terms of distinction, and which is seen engraved on the Regimental arms. Again in the opinion of others the suitability of having the recumbent figure of a dead soldier was open to question. Both these points were dealt with by the Central Committee when there were full discussions, and on each occasion substantial majorities were in favour of their adoption in the form now seen.

The type of gun to be placed on the top was, in the first instance, left to Mr. Jagger who, after a careful inspection of all the guns in the Imperial War Museum, strongly recommended the 9·2 inch Howitzer, stating that the difficulty of representing wheels in sculpture prohibited his adoption of any of the Horse or Field equipment and moreover giving it as his opinion that the ordnance selected fulfilled his requirement of representation of the great power and force of the artillery in the Great War. The Committee endorsed this opinion. It may be of interest to know that this particular Howitzer was the outcome of steps taken before the war to provide the siege batteries with a heavy howitzer of modern type. In June, 1914, a trial of the experimental one was made at Rhyader. It proved very satisfactory, but before provision of more could be made, war broke out. Orders were immediately given for the manufacture of thirty-two more to this design with some very small modifications indicated at the trial to be necessary.

The only one in existence was required at first for design purposes but as soon as it could be spared it was sent to France and its existence became quickly known and it at once received the name of "Mother." Before the end of the war no less than 512 9·2 inch howitzers were supplied, all resembling in a very close degree the original one which now can be seen in the Imperial War Museum.

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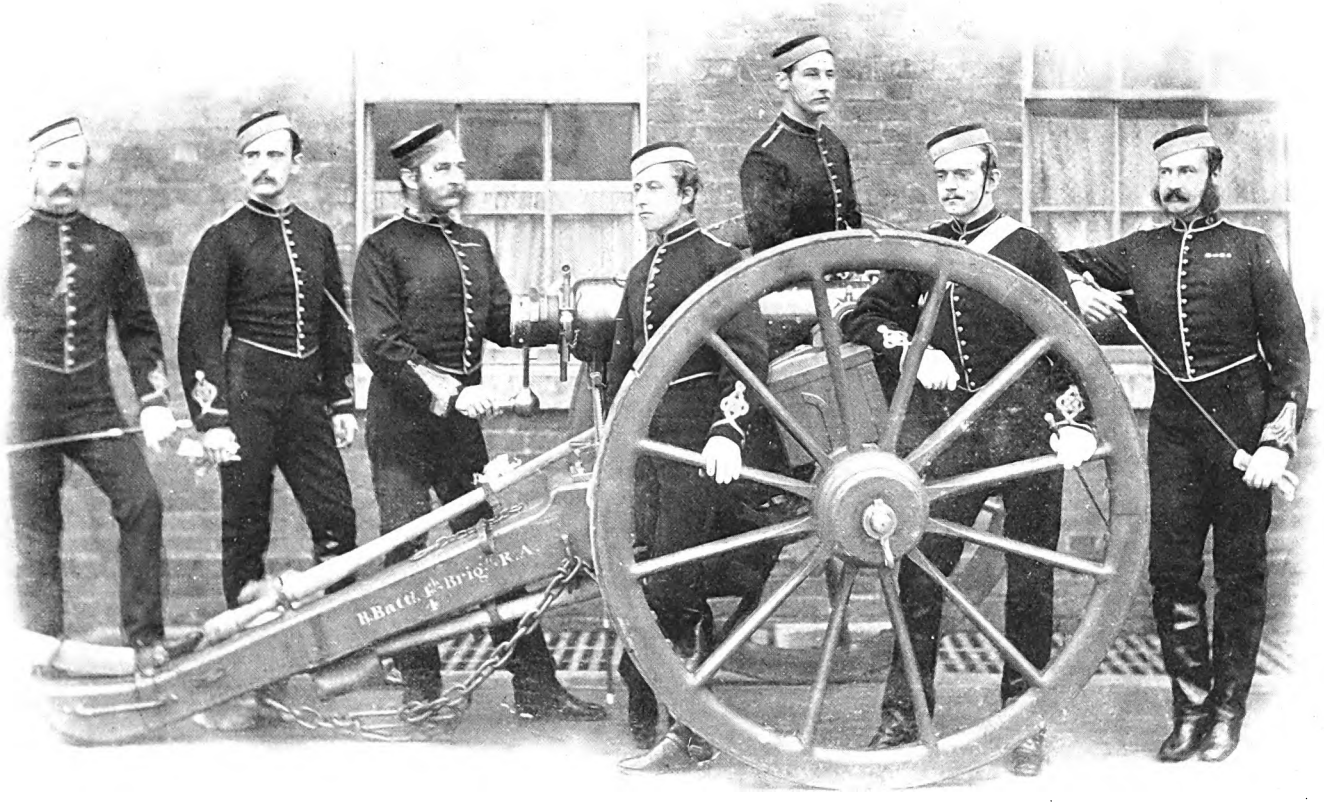

THE OFFICERS OF B. BATTERY, 4TH BRIGADE, ROYAL ARTILLERY, IN 1868.

Names reading from left to right : Lieut. A. F. Pickard, V.C., Lieut. G. H. O'Malley, Captain and Brevet Colonel N. O. S. Turner, C.B., H.R.H. Prince Arthur, K.G., Lieut. W. P. Georges, Lieut. F. H. Eardley-Wilmot, 2nd Captain and Brevet Major H. J. F. E. Hickes.

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NOTE.—*With reference to the photograph shown opposite and which was kindly furnished by Lieut.-Colonel J. H. Leslie, late R.A., the following are brief particulars of services of the officers, who were then serving with his Royal Highness.*

Captain & Brevet Colonel N. O. S. Turner, commissioned 1847, 2nd Captain, 1854, Captain 1859, Major-General 1880, Lieut.-General 1883. Served in the Crimean Campaign (Bt. Major) and Indian Mutiny (Bt. Lieut.-Col. & C.B.). Died 1884.

2nd Captain & Bt. Major H. J. F. Ellis Hickes, commissioned 1854, 2nd Captain 1860, Colonel 1877. Served in the Crimean Campaign and in China (Bt. Major). Died 1884.

Lieut. A. F. Pickard, commissioned 1858, 2nd Captain 1871, Bt. Lieut.-Colonel 1878. Served in New Zealand (VC, C.B.). Officer in attendance upon, and afterwards Equerry to, H. R. H. Prince Arthur. Subsequently Groom-in-Waiting and Assistant Private Secretary to Her Majesty Queen Victoria. Died 1880.

Lieut. W. P. Georges, commissioned 1862, Captain 1875, Lieut.-Colonel 1891, died 1894.

Lieut. G. H. O'Malley, commissioned 1865, Captain 1877, Colonel 1897, died 1909.

Lieut. F. H. Eardley-Wilmot, commissioned 1867, killed in action in Ashantee 1873.

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APPENDIX.

The following articles and letters have been selected out of the many which appeared in the Press after the Memorial had been unveiled.

From the "Daily Telegraph."

London's latest War Memorial was unveiled with great dignity and impressiveness yesterday. It is the memorial to the 49,076 gunners of the Royal Regiment of Artillery who gave their lives in the Great War. They deserved a stately memorial. They have it. They deserved an heroic memorial, and the sculptor has not failed them. Here is a memorial vast and titanic, overpowering, almost oppressive, crushing, and yet it lives and speaks as the huge mass of a Pyramid, and utters an urgent and eloquent message. We can well imagine that there may be some controversy over Mr. Jagger's howitzer in stone. There is nothing like it in London. It is a ringing challenge to convention. It startles the unaccustomed eye. It is ruthlessly bare of Christian symbolism. There is no Saint either in the stone or the bronze—not even that good fighter St. George. It is sheer realism. It is no idealised gun which thrusts up its vast mouth to the sky, and the three standing figures at the side are plain soldiers of the regiment; while the figure lying stark, with head covered by the flag, is just a dead artilleryman who might be waiting for the stretcher to bear him away. But here is a memorial that tells its own story of courage unsurpassed and duty done—both in mass—and the symbol chosen is not the mobile gun which the gunners love best, but the monstrous howitzer which the most monstrous of all wars produced—informe, immane, ingens—and amid all the manifold instruments of carnage the most irresistible in the havoc which it spreads. This howitzer, crouching low on its enormous sculptured pedestal of stone, is a terrifying emblem. It is humanised only by the bronze figures of men who served the guns in action which will guard it for generations to come. The graven names of countries and continents illustrate and illuminate the proud word "Ubique," which is the motto of the Royal Regiment of Artillery, and record in imperishable letters where the rough path of Right and Glory led. As no doubt there will be suggested to the minds of many by the relaxed figure of the driver who faces St. George's hospital, with his arms flung out as he leans upon the stone step, and his helmet tilted over his musing face, the unspoken question as to the meaning and purpose and fruit of all that daring, all that endurance, and all that suffering. It is the question which will continue to be asked by generations to come, even as we ask it now, and from what lips could it better proceed than from these?

We are confident that London will value this Royal Artillery Memorial among her most precious possessions, and that Mr. Jagger has accomplished a great achievement in a department of our national art in which failure has been more common than triumph, and a too-slavish adherence to the conventional by Committees of Selection has too often paralysed the

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sculptor's originality. The Royal Artillery have been fortunate. At the first meeting called in connection with the project it was resolved that the memorial should be "realistic," and the specifications to the sculptor was for "a sculptured group in bronze such as will be immediately recognisable as an artillery memorial to any gunner or layman of ordinary intelligence immediately it comes within his view." There is no mistaking a giant howitzer, and the vivid imagery in low relief on the sides of the pedestal is as crowded with the movement of batteries in action as the big gun above is fixed, immovable, and still. The sculptor, we are told, strove to suggest "the relentless power played by the gun in this war which was, more than ever before, a war of machinery." He has well succeeded. The whole conception suggests grimly that long, murderous line of parallel, deep-cut trenches which stretched across Europe from the coast of Flanders to the Alps, and behind them the guns and the greater guns roaring death. No one can challenge the realism of this memorial. And should anyone find it oppressive let him raise his eyes to the Constitution Arch and note how the flying horses breast the air and how swift Victory in her chariot is riding laurelled crown in hand, to lay it upon the dead artilleryman. For many a long day, we think, this Artillery Memorial at Hyde Park Corner, where the memory of the great Duke still lingers as nowhere else in London, will be the theme of eager conversation. We believe that it will capture London as the Cenotaph has captured it, though in a strangely different fashion, like some great tragedy, as Aristotle said, purging the feelings of the spectators by the emotions of pity and fear.

From the London Correspondent of the "Manchester Guardian."

The Gun.

England in its long history has had many war memorials, but the Artillery Memorial at Hyde Park which was unveiled to-day differs in form and sentiment from the memorials of other wars. The difference springs from an entire difference in the approach of the designers to their subject. War memorials in the past were usually the work of middle-aged sculptors who knew nothing about war and its realities but were familiar with the classical rhetoric of victory and mourning. Mr. Jagger, the sculptor of the gunners' memorial, served and was wounded in the trenches, and Mr. Lionel Pearson, the architect, served also in the war. There are now several memorials in sculpture and in paint done by the young men who fought in the war; this is the most important and significant of them.

Some people criticise the design as the glorification of war, but it is not that. The gun, of course, dominates the monument, but the scenes in the reliefs and the four bronze figures give it a terrible significance that is not the old-fashioned hymn to the weapon—something very far from Kipling and Henley. The sweating, straining, suffering men and beasts in the panels have a passionate realism, and the children of a future age will see in them war without the gloss. The bronze figure in the cloak, with his arms outstretched and resting on a shelf of the plinth,

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carries in his gesture the suggestion of mankind on a sacrificial cross. A recumbent figure lies at the northern end.

Different meanings will be read in this as in all genuine works of art. One meaning that came to me was that the great gun was the symbol of all war in that, once war was started, nothing could stop the doom related in the statuary below, just as nothing could stop what would come from a howitzer once the lever was pulled.

The Artillerymen.

It was explained to-day that the stone monument to the Royal Artillery is only part of a much larger memorial, and that for years a committee representing all ranks of the regiment has been helping ex-artillerymen, their women-folk and children in practical ways. This accounts for the imagination and sympathy that marked the arrangements to-day, and the anxiety that all the people connected with the memorial should be represented.

It was not enough that all ranks of the regiment should unite to provide a wreath of roses and laurel, or that the wreath should be of great size. Lord Horne, who laid the wreath at the foot of the memorial, must be accompanied by a party representing the past, present and future of the regiment. The badge on the inscription card attached to the wreath was taken from the body of an unknown artilleryman found on one of the battlefields of France. The card placed beside it was framed in wood from broken crosses found on the graves of artillerymen whose bodies had been removed to consecrated ground. The badge at the top of the frame was from the tunic of an officer killed while fighting his guns in action.

The gun on which the wreath was carried was the one from which the first British shell of the war was fired, and the pair of horses in the lead of the gun team had served throughout the war in France. One can feel quite at ease about those horses. The people who planned to-day's thoughtful programme will see that the horses have an honoured and comfortable old age.

From the "Morning Post."
(By General Sir Ian Hamilton.)

Several years ago I was a member of a Committee on the Lord Roberts Memorial, of which Committee the late Lord Curzon was President. On taking the chair at our first meeting he gave out an admirable address on English Art, and especially on the ability of the British artist to grapple with bas-relief. He wound up by saying that he had spoken of these matters at some length so as to impress on us the importance of our duty. for he had heard that day a bad piece of news, namely, that the Royal Regiment of Artillery had decided upon a barbarous and retrograde form of memorial which would consummate the artistic ruin of London. The Royal Artillery Committee, he said, had decided to have a howitzer mounted on an enormous rock. "Now," said Lord Curzon, "to my mind the ugliest thing in the world is a gun with one exception only—a howitzer.

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A howitzer resembles a toad squatting which is about to spit fire of its mouth. Nothing more hideous could be conceived."

Now we all listened with great attention to Lord Curzon, who did all through his life take the greatest and most praiseworthy interest in art. But I think I may safely say that if he had been at the memorial service to-day at Hyde Park Corner he would have re-considered his judgment. As to the Monument itself, owing to the crowds I only saw one of the four sides, but that was enough to make me feel that I should have only two serious criticisms to offer. One was that this new Artillery memorial would make most of the other monuments in London seem weak and ineffective. The other that it might foster the war spirit.

Many of the figures and groups on the memorials it has been my privilege to unveil have been modelled on young soldiers sent out from the depots of the units which were to be commemorated, and the commanding officers of these depots always showed the best looking lads with delicate Greek features and smooth cheeks. The result has been all over England a sort of bastard Greek sculpture. Now these Royal Artillerymen shown on the memorial opposite Hyde Park Corner are the real thing, and not only the real thing, but the real thing in the rough.

The whole bas-relief is a rendering of what Queen Isabella of Spain said when she first saw the Gordon Highlanders, namely, "Bloody war." As to the ceremony, from A to Z, namely from the arrival of Field-Marshal the Duke of Connaught to the laying of the wreath by Lord Horne, it was absolutely perfect and worthy of the traditions of the Royal Regiment. Not a hitch anywhere, not a false note.

I think many of the spectators must have felt a lump rise in their throats when they saw the gallant bearing of the leading horses of the gun-teams who went out with the Contemptibles in 1914 and seem still as keen and fit as they were on that day to take on anyone or to kick them off.

From "The Times."

Sir.—May I, as an ex-"gunner" officer, make a short reply to your art critic, particularly the criticism: "It has neither the appeal to actuality, nor the more subtle and lasting appeal of monumental sculpture" ? Your critic cannot have been a "gunner" during the Great War, otherwise he would not have given utterance to such a sentiment.

The "Gunner" Memorial is nothing if not real, and conveys nothing if not actuality; the more subtle and lasting appeal to monumental sculpture must be judged by future generations, who, we trust will not know the actualities of war. To all "gunners" who knew those days in France and Belgium, when we were rationed to a few shells per gun per week, and lived on and through the days when we had shells, shells, shells, and it was buffer springs and ammunition mules which were rationed, the Memorial at Hyde Park Corner conveys the sense of actual power which "gunners" felt when we could respond—and did respond—to every call from our infantry.

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Standing yesterday at the unveiling ceremony vivid scenes came back —actual scenes of battles—battles of guns. The shivering, stinking slush of dawn, waiting for zero hour, the relief when gun-fire was ordered—an actual relief, even though hell and all the furies were then let loose. The savage bark of the 18 pounder, husky cough of 4·5 "How.," the roar and rush of the 6in. "Hows.," and our giant big brothers, the 9in. "Hows.," giving us little fellows sense of actual power—sense of victory; and all was one sustained thunder, which carried "gunners" to an oblivious sense of all but the service of guns—service which our infantry trusted; they knew the actuality of the guns. The "Gunner" Memorial will mean so much to all arms; how often did the infantry come back through the guns from the front line, knew us and knew ours guns—little and big—as their best friends; and I sometimes thought the guns knew what they had to do, and were aware of their trust.

It is easy to write of all that the Memorial means—perhaps it means too much; but it is terrible in its actuality, terribly real, terribly powerful —a lasting memorial of horrible, bloody war, of what human flesh did, and can endure; an enduring memorial that war means destruction. It is the Memorial our fallen comrades would have wanted. They knew actuality. They would not ask for anything else.

Yours faithfully,

MAC GREGOR KNOX, Major, late 15th Brigade, R.F.A., B.E.F.

Sir,—I certainly appreciated many of your Art Critic's comments in *The Times* of October 19 on the Royal Artillery Memorial at Hyde Park Corner. At the same time I can well understand and sympathize with Major MacGregor Knox's rejoiner in your issue of the following day.

The point, however, seems to me rather this. That the memorial is impressive and has many admirable artistic features cannot be denied. Yet to some of us that the feature dominating it should be the howitzer on its summit is an offence. The question, no doubt, as your art critic remarks, is an ethical rather than an artistic one. But in public memorials of this sort, with their wide popular appeal, the ethical side of matters is important. In the relief that runs round the lower part of the memorial, and in the four bronze figures silhouetted against it, vivid unescapable emphasis is laid upon the unspeakable horror of the war and the strenuously noble part played by the Artillery throughout it. But it is really a fine culminating symbol to have set high aloft over all, as finally expressive of our thankfulness to God for deliverance, and to keep green the blessed memory of those who sacrificed their lives for us, just this bare facsimile in stone of the latest mechanical invention of man's wit for blowing, on lamentable occasion, his fellow-creatures and their habitations to pieces?

I am Sir, your obedient servant,

SELWYN IMAGE.

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Sir,—I am loth to enter this controversy, but I feel that I must ask permission to say a few words in reply to Mr. Selwyn Image, who in his letter misses two points which seem to have a highly important bearing on the matter at issue.

First, he fails to recognise the fact that to an artilleryman his gun represents the "colours" of his regiment—with all that that means. Men die round it, in its service; as the years go those still left who tended it and fought it pass away; but the gun, their master, embodying the "spirit" of the artillery, remains.

Secondly he is probably unaware of the fact that the howitzer surmounting the memorial is an exact model of the original 9·2in. howitzer known throughout the original British Expeditionary Force as "Mother" and now in the Imperial War Museum. Mr. Selwyn Image asks, "is it really . . . . a symbol . . . . expressive of our thankfulness . . . . for deliverance?" Speaking as one who had the privilege of serving throughout the war in the field I say unhesitatingly, "Yes," and in doing so I know that I voice the views of the majority of those who so served. In those early days when our sorely tried infantry were being blown to pieces by the high explosive shells of the German heavy howitzers, without hope of receiving any really effective support from the pigmy guns of their own artillery, surely, if ever anything spelt "deliverance" it was the voice of "Mother" and the comforting hum of her shells over their heads—deliverance to the battered men in the trenches, and deliverance to the artillery from the torturing thought that they were powerless to help their comrades of the infantry.

And now the image of "Mother" is set aloft as a symbol, a dumb witness of duty well done and a memorial to those brave men who have died round their guns, faithful unto death, serving their King and Country, and keeping untarnished the honour of the Royal Regiment of Artillery. Those who helped to hold the gates against the enemy in the Great War, and those who lost their nearest and dearest in the same cause, will understand; as for the others, has not time now come, Sir, to let this matter rest?

Yours faithfully,

H. UNIACKE,

Major-General.

From "The Times," October 29th.

A CONTROVERSIAL MONUMENT.

The daily crowd that still gathers round the new Artillery Memorial at Hyde Park Corner—not solely to lay flowers at its base, but also to scrutinize its composition—and the long series of letters which have been addressed to us upon the subject, testify to the deep public interest which Mr. Jagger's work has aroused. And the published letters have shown with what various and opposite feelings it is regarded. One fact at least is common ground—the sculptor has done what he was commissioned to do

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with immense power and skill. The members of the Royal Artillery Committee decided, first, that the regimental memorial was to be realistic, and, second, that it was to be unmistakably and immediately recognisable as an Artillery memorial, not a memorial of any other branch of the Services. Mr. Jagger carried out their wishes to the letter. Through the medium of stone and bronze he has expressed the part played by the guns in the war. It was a mechanical war to a greater extent than any in the past—though, it may be, less than future wars. A mass of masonry, becoming as it rises more restricted by stages, forms an emplacement for a 9·2 howitzer, represented as literally as is possible in stone. The mortar that is mounted on the Horse Guards Parade is presented in a guise that is almost picturesque. Not so Mr. Jagger's creation. It is the most faithful reproduction of a weapon which rendered long service in the war and which is now to be seen in the Imperial War Museum. The bas-reliefs, excellently modelled, show the various phases of a gunner's work in action, while four bronze figures, one prone in death, loom large on each face of the monument. The whole effect on the onlooker is massive, impressive, eloquent; in the strict sense of the word, it is awful. War, mechanicalized war, with its destructiveness, and cruelty, and desolation, with the imperious call that it makes upon the whole strength and courage and self-sacrifice of men, stares the onlooker in the face.

The criticisms that have been made of it are both technical and general. From the artistic point of view it has been pointed out that the howitzer which crowns the memorial is neither a symbol nor an actual weapon in metal, and that the artist has accordingly fallen between two stools. The bronze figures have been condemned as incongruous, from their size and free position, with the figures of the bas-relief; the culminating figure is deemed inappropriate, and there is no line of composition, it is said, that gives an impression of beauty. The general and deliberate effect, in fact, is ugliness. This view was perhaps most eloquently put by the late Lord Curzon, who, as soon as he saw the project for the memorial, is reported by General Sir Ian Hamilton as having said: "To my mind the ugliest thing in the world is a gun, with one exception only—a howitzer. A howitzer resembles a toad, squatting, which is about to spit fire out of its mouth. Nothing more hideous could be conceived." And the argument has been given a general form in the claim put forward by several correspondents that Hyde Park Corner is public property, that it is one of the finest sites in London, and that a thing of ugliness should not be allotted a place there.

No one is entitled to dogmatise in matters of taste, and controversy will doubtless rage for many decades over the merits and demerits of this work of art. Some of the criticisms are plainly founded on misconceptions, others represent the discrepancy between the gunner's point of view and that of the general public. To the latter the howitzer may appear a squat toad spitting fire, but to the artilleryman a gun is the equivalent of the regimental colour. He serves the gun amid the crash of hostile shell; when the din and fury of the fight almost overwhelm the faculties of reason

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he recognises only his gun and his duty to it; he stands by it, and is killed by it. The service of the gun is all in all to him. It is entirely natural, then, that the Artillery Committee should have chosen such a memorial, and, having so chosen, they have been fortunate in their architect and sculptor. Had the monument been erected at Woolwich, the headquarters of the regiment, as was originally suggested by the First Commissioner of Works who gave the site, there would probably have been little or no criticism. But what is an ideal memorial for the particularist view of the artilleryman may not be so easily acceptable to the public. And if the site is Hyde Park Corner, the very centre of London, traversed by a greater volume of traffic of every sort than any other place, the public clearly has a right to be heard. It was natural enough that the Artillery should desire a more central position than Woolwich, and their splendid services to the whole country and the large toll of their dead fully entitle them to the claim. But the conclusion is that in future, if a prominent public site is chosen, the nature of the memorial ought not to be considered a matter for the Memorial Committees alone. The Fine Arts Commission is now in existence to supplement the efforts of the Board of Works; and it is being more and more frequently consulted by public bodies and others.[1] It is of real importance that it should achieve a position of authority, and that its labours should be more widely known.

[1] See para. 4, p. 476, and para. 1, p. 477. S.v.D.

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"DUNCAN" ESSAY, 1924-25.

Counter-Battery Work in Mobile Warfare.

By Captain R. H. A. Kellie, M.C., R.A.

"BIS DAT QUI CITO DAT."

(Recommended for publication.)

CONTENTS.

INTRODUCTION.

Chapter I. Limiting factors and general requirements in counter-battery work in mobile warfare.

Chapter II. The effect of modern developments in weapons and technical equipment upon counter-battery work in mobile warfare.

Chapter III. Counter-battery work in the advance.

Chapter IV. Counter-battery work in the attack.

Chapter V. Counter-battery work in the defence.

Chapter VI. Summary and general conclusions.

INTRODUCTION.

1. The meaning of mobile warfare.

In discussing the subject of counter-battery work in mobile warfare, it is necessary to have a clear idea as to what is meant by the term "Mobile Warfare." Throughout this essay mobile warfare will be taken to include :—

(1) The advance to the battlefield, including the first contact between the opposing advanced troops.

(2) The battle between the main forces wherever it partakes of the nature of the encounter attack, or of hastily organised resistance.

(3) The withdrawal and pursuit.

The deliberate attack on highly organised defences and the defence of trench warfare positions will not be considered.

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2. *The necessity to appreciate the limitations imposed upon counter-battery work.*

Counter-battery work is inevitably connected in the minds of many artillery officers who served in the war of 1914-18 with the developments of the trench-warfare period. It is therefore necessary at the outset to show how these ideas on counter-battery work must be greatly modified in mobile warfare. Historically, there is not very much to help us. If there had been a real period of mobile warfare for several months before the armistice in 1918, instead of the so-called "semi-open" warfare phase, many more valuable lessons would have been made available to us. There is very little to be learnt from our experiences in the mobile warfare period of 1914, for then, none of the refinements of counter-battery intelligence, tactics or control had been developed.

CHAPTER I.

Limiting Factors and General Requirements in Counter-Battery Work in Mobile Warfare.

1. *Information.*

Counter-battery work, as carried out during the latter part of the Great War, owed the greater part of its success to the highly developed system of artillery intelligence in force. Personal reconnaissances by aeroplane and balloon observers, excellent aeroplane photographs of the corps counter-battery areas, increasingly accurate work by sound-ranging and flash-spotting sections, a well-developed system of establishing "shelling connections" by the collating of a mass of reports of hostile shelling—all these sources contributed to furnish counter-battery staff officers with a fairly accurate knowledge of the hostile artillery dispositions on their respective fronts.

In mobile warfare, aeroplanes, ground observers to a very limited extent, and possibly balloons, will be the main sources of information. Flash-spotting and sound-ranging sections can only come into action when operations start to crystallize. There is no time for elaborate records of activity, and shelling connections will only be of the roughest nature. It is obvious therefore that the fog of war will tend to be fairly dense as far as the enemy's artillery positions are concerned.

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2. Available artillery.

During the operations immediately prior to the armistice in 1918, the amount of medium and heavy artillery available for counter-battery work was very considerable. Generally speaking, all the mass of artillery which had been accumulated in the position warfare period was available, so far as limitations of ammunition supply and the condition of forward roads permitted its use. If war were to break out to-morrow and if mobile operations were to be commenced in Europe, it is certain that the amount of artillery available at first would be far smaller. It would probably be limited to the divisional artillery of each division with the addition of one medium brigade and, possibly, an army field artillery brigade, for each corps. Assuming that this view is approximately correct, it is at once evident that there would be far less artillery for counter-battery work than there was in the "semi-open" warfare period in 1918. The danger is that senior officers with war experience of this nature may expect too much, while junior officers without war experience may not realise in peace the importance of counter-battery work. In peace time training the preponderating effect of fire is apt to be overlooked. Mobility is sought at the cost of shell power. In war, fire and shell power rapidly come into their own. Demands of increasing urgency are made upon the artillery to stop hostile shell fire on advancing troops, headquarters, billets, bivouacs and encampments.

The great difficulty in counter-battery work in mobile warfare will be the allocation, from a relative small total of available artillery, of a sufficiently large amount of artillery to enable the necessary counter-battery work to be carried out. The question of this allocation will be considered later in the various stages of mobile warfare.

3. Ammunition.

Ammunition supply is of vital importance in mobile warfare. There is far less time to amass ammunition for any operation than there is in position warfare. There is still less time to replenish ammunition during any operation. Generally speaking, the problem for a particular attacking operation in mobile warfare may be considered as involving the use of such ammunition as may be present at railhead, and in front of railhead, at the time in question.

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If the operation is delayed for more than 24-48 hours for the purpose of concentrating additional artillery and ammunition, the defenders will possibly make a better relative use of the respite by improving their organisation. The situation will have passed beyond that of the defence of a hastily organised position and, therefore, beyond the scope of this essay.

Two conclusions can be drawn from the above brief study of the ammunition factor. First, fire for destruction in the old trench-warfare sense is impossible. Neutralisation of a very temporary nature is all one can expect to achieve with the available ammunition. Secondly, in considering the possibility of employing light artillery in counter-battery work, the conflicting requirements of infantry support, anti-tank fire and counter-battery work, show that there can normally be little or no ammunition available for the 18 prs. for the latter purpose. Therefore, if counter-battery work is considered essential by the artillery commander, the medium artillery, and possibly the 4·5″ howitzers, must be kept primarily for this purpose, and cannot be lavishly employed to "thicken" any modified barrage or bombardment, or to assist in the tasks which may be allotted to the divisional artillery in the immediate support of the infantry.

4. Communications.

Effective counter-battery work is almost entirely dependent on good communications. Demands for neutralisation must reach the counter-battery staff, or the units primarily responsible for neutralisation, with the least possible delay; otherwise, rapid changes of position on the part of the hostile artillery may render the subsequent fire completely ineffective. Ground communications are, at present, a very difficult problem in mobile warfare. Improvements in wireless communication will help matters considerably, but one cannot expect to get the rapid and effective results which were possible with the normal trench warfare systems of communications. Communications with the air, from which the great majority of locations will be received, must be improved. All batteries must be capable of taking in N.F's. Delays are bound to occur if only one battery in a field brigade has a receiving set, or if it is located at brigade headquarters. It must be possible for

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batteries advancing into action to take in locations sent out by aeroplanes, so that no time is wasted when they go into action in engaging such targets if required.

5. General requirements.

The general requirements of counter-battery work in mobile warfare will include the neutralisation of the following forms of hostile artillery:—

(a) Field and medium artillery.
(b) Close support artillery.
(c) Anti-tank artillery.
(d) Anti-aircraft artillery.

It is unlikely that any of these types of artillery, except possibly the anti-tank artillery, will normally expose themselves to observation from the ground. All the other types are more likely to be located, and ranged upon if time and ammunition is available, from the air. The paramount importance of aerial observation for all purposes in mobile warfare will make it essential for the hostile anti-aircraft artillery to be effectively engaged whenever possible.

CHAPTER II.

THE EFFECT OF MODERN DEVELOPMENTS IN WEAPONS AND TECHNICAL EQUIPMENT UPON COUNTER-BATTERY WORK IN MOBILE WARFARE.

1. Aeroplanes.

It has been shown that the co-operation of aeroplanes is of the greatest importance in counter-battery work. At the end of the war, in 1918, this co-operation had reached a high standard. Since then radio-telephony has greatly improved and will assist enormously in maintaining between aeroplanes and artillery a personal touch which was lacking in the communications by wireless code messages and ground strips. It will be of particular value in enabling the aeroplane observer to indicate the positions of hostile batteries when only small scale maps are available. For instance, a message in clear to the effect that a battery is in action 400 yards S.S.E. of the 2nd *O* in TROWTON may be clearer than a "protractor reference" message in code.

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2. Balloons.

Balloons share with aeroplanes the advantages of direct transmission of information of activity seen. They can keep up fairly well with an advance provided the roads are good enough for heavy motor transport. In the future they will probably be towed by cross-country tractors. They are very vulnerable to attack by aeroplanes and long range guns. The latter, however, require cross observation which takes time to arrange, and is difficult in a quickly moving situation. Balloons are undoubtedly superior to aeroplanes for obtaining a good general view of the situation behind the enemy lines especially in open country. The great speed with which an aeroplane moves only allows the observer to fix his attention on a particular area for a short time before a change of direction is necessary. On the whole, assuming that the enemy is not overwhelmingly superior in the air, and that adequate anti-aircraft defence can be provided for their protection, balloons may be risked in mobile warfare on account of their comparative mobility which is capable of improvement.

3. Wireless.

In the future, the development of wireless communication within the corps will greatly assist in the speeding up of counter-battery intelligence and control in mobile warfare. At present, however, the speed and reliability of wireless communication cannot possibly be compared with that obtained by telephone communications under position warfare conditions. The C.B.S.O. must be allotted by corps headquarters a wireless set with which he can communicate with divisions during the advance.

4. Mechanicalisation.

It is possible that developments in mechanicalisation will lead to the mounting of the majority of the artillery in, or on, armoured track vehicles from which guns can fire if necessary. If this is done, counter-battery work will become far more difficult. Batteries will not be so easily neutralised by shrapnel and shell splinters. They will be able to avoid being ranged upon after location by prompt and frequent changes of position unless engaged in vitally important tasks at the time. Attempts to neutralise these batteries must be very promptly made. Any delays after location may lead to absolute waste of ammunition.

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5. Tanks.

The advent of the tank has led to the anti-tank artillery. In certain circumstances where the ground is favourable for tanks, anti-tank artillery may have to be provided in large numbers. Whether these guns are ordinary field guns or special anti-tank guns of a lighter nature, they will have to be sited well forward for direct fire. It will be the task of the attacking artillery to destroy these guns as rapidly as possible once they have opened fire and disclosed their positions. This will probably be the most important counter-battery task in the attack.

6. Flash reduction.

It is obviously of the greatest importance to the artillery to reduce the visibility of their flashes as much as possible in view of the great part played by aeroplanes in locating their positions by day. Flash-spotting sections will be baffled by night. The ideal gun with no flash or sound of discharge will never be made but the reduction of both flash and sound must be aimed at by the ordnance experts.

7. Gas shells.

While it cannot be denied that gas shells, properly used, may very effectively neutralise a battery, it should not be forgotten that, in mobile warfare, even if the use of gas were permitted, it would not be possible to carry a sufficient quantity with the present scale of ammunition. There must always be a sufficiently high proportion of definitely destructive ammunition. This is the reason why the proportion of smoke is low in comparison with shrapnel and high-explosive shells. Wrongly placed concentrations of lethal gas for instance, to leeward of a battery may be completely innocuous, whereas similar concentrations of high explosive shell with instantaneous fuzes may cause casualties from splinters even if the mean point of impact is a quarter of a mile away from the battery.

8. Range.

The army which allows its artillery to fall behind in the development of longer ranging weapons will inevitably be at a serious disadvantage in counter-battery work. The 4·5″ howitzer, otherwise an ideal weapon for mobile warfare, has far too short a range for modern requirements.

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CHAPTER III.

COUNTER-BATTERY WORK IN THE ADVANCE.

1. Objects.

In the advance to the battlefield, and in the subsequent contact between the opposing advanced troops, it will be necessary to have the artillery so disposed as to enable it to engage effectively the advanced artillery of the enemy which may otherwise delay our columns considerably. There were several instances in 1914 during the advance to the Marne when single batteries held up our advance for considerable periods.

The artillery of the advanced guards must be prepared to carry out this task and also to collect all possible information as to the hostile artillery dispositions so that, on the deployment of the main body, no time need be lost in appreciating the artillery situation and in forming the artillery plan.

2. Information available.

The information available will tend to be very limited, especially if the conditions are unfavourable for aerial co-operation. Normally, the aeroplane will be the sole reliable source of information, though it may be supplemented to a slight degree by ground observation if the terrain is suitable. There will be no time for flash-spotting and sound-ranging sections to get into action. Balloons may be risked but will more probably be kept back until deployment has been carried out. Personal reports from the advanced troops as to localities shelled, direction and calibre, may be invaluable as giving an indication of the amount of artillery in action. They may confirm an impression that the main hostile position has been reached. For this reason, infantry and cavalry officers must be taught to be able to distinguish between calibres of shells, to judge directions approximately, and to incorporate the above information in their messages to higher formations. Tanks and armoured cars which come under fire must transmit similar information through the formations to which they are attached. This must be practised in peace manœuvres. It can only be done by intelligent umpiring.

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3. Guns available.

The guns available for counter-battery work in the advance will normally be few in number. Much will depend upon the method in which the advance is being carried out, whether on a broad front, using all available roads, or on a narrow front, with one advanced guard per division. There may be a medium battery attached to the artillery of each advanced guard. If so, this battery should be used primarily for counter-battery work. Its commander must be prepared to collate all the available information and to pass it on to the divisional artillery to which he is attached. Light artillery will engage batteries located from the ground with ground observation within reasonable limits of ammunition for it must be remembered that its primary role will be to help the advanced infantry forward.

4. Control.

Control of counter-battery work at this stage must obviously be very decentralised. The normal counter-battery staff and organisation cannot attempt to assume control until the situation develops, but every effort must be made to assume control as early as possible after definite resistance is encountered.

It is difficult to decide upon the best place for the counter-battery staff in this phase. Assuming that the staff consists of the C.B.S.O., his staff captain, intelligence officer and orderly officer, what is the best use that can be made of this staff at this time? To arrive at a reasonable conclusion, it is necessary to visualise the counter-battery work that is being carried on, the information that is being obtained, and the channels through which that information is passing. Finally, we must remember, that it is the C.B.S.O's task to appreciate the hostile artillery situation at all times so that he can assist the Corps artillery commander to formulate the artillery plan in support of the attack.

The artillery of the advanced guards are engaging hostile batteries with ground and aerial observation. Their intelligence messages are passing through artillery H.Q. after considerable delays due to the difficulty of communication. Similarly, infantry intelligence messages possibly incorporating reports of hostile artillery activity are reaching divisional headquarters through brigade head-

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quarters. Air locations in the shape of N.F. calls are being transmitted by the aeroplanes of the corps squadron and taken in by travelling receiving sets of brigades not yet in action and by the artillery of the advanced guards which is already in action. Reports, which possibly include valuable information as to the general strength of the hostile artillery, are being dropped at dropping stations. Verbal reports can be obtained at the advanced landing grounds.

All this information, although of varying importance, is needed by the counter-battery staff officer for his appreciation. The problem is how to collect it as rapidly as possible. The verbal reports of experienced pilots or observers are of the greatest importance but, without shelling connections, such reports are incomplete. Landing grounds are apt to be too far from the advanced troops to enable the reports from those troops to reach them quickly enough to corroborate or amplify the reports of aeroplane observers. It appears, therefore, that it will not be sufficient for the C.B. staff to be located at these landing grounds. A possible solution might be to have the C.B.S.O. and his intelligence officer at advanced landing grounds while the staff captain and orderly officer act as liaison officers, collecting information from divisional headquarters and advanced guard headquarters. If this distribution of duties is in force, an officer of the divisional R.A. staff must have all counter-battery information extracted from messages and transferred to maps if time is available, so that no time is lost when the representative of the counter-battery staff visits divisional headquarters for information. Similarly, the adjutant of the artillery brigade attached to each advanced guard must be responsible for collating counter-battery intelligence both from his own units and from the presumably adjacent advanced guard headquarters.

The role of the counter-battery staff will therefore be one of collation, not of control; the piecing together of every scrap of available information from all sources in anticipation of the moment when the situation will admit of active control. Divisional R.A. staffs, and the brigade staffs of medium artillery and advanced guard artillery will issue the executive orders as to allocation of batteries and allotments of ammunition.

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CHAPTER IV.

COUNTER-BATTERY WORK IN THE ATTACK.

1. Objects.

As movement forward becomes more difficult, and as the extent and nature of the hostile position becomes apparent, the next phase is entered upon. Deployment, and the locality of the decisive attack, have to be arranged. The C.B.S.O. endeavours to appreciate the artillery situation as best he can with the information available. If the attack is to be co-ordinated by the corps commander, and if the corps artillery commander assumes control, a definite counter-battery allotment of artillery and ammunition will be made. Otherwise, this allotment must be left in the hands of each divisional C.R.A. The object of counter-battery work will be the neutralisation of the hostile light, anti-aircraft, medium, and anti-tank artillery. The first three types may have already disclosed their positions to some extent, the last named will presumably be unlocated and silent.

2. Guns available.

It is assumed that the hostile position is a hastily organised one. It is also assumed that there has been sufficient time to ensure that the full strength of the artillery of the force can be deployed. In deciding upon the allotment of artillery for counter-battery work, we are at once confronted by the problem of what is the absolute minimum of artillery support necessary to assist the infantry to advance against hastily organised positions in mobile warfare. It is impossible of course to lay down any arbitrary proportions. Each case must be judged on its own merits.

The following are some of the factors which must be taken into consideration :—

(a) The greatly increased strength of the defence, even in hastily organised positions, due to the improvement of automatic weapons, and to the greater number of such weapons.
(b) The natural strength of the hostile position.
(c) The morale of the attacking infantry.
(d) The information available as to the enemy's artillery. It may be extremely meagre.

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(e) The relative strength of the opposing artillery if an estimate can be made.

(f) The suitability of the weather for aerial co-operation.

It is for the commander of the force to decide then, after weighing such factors as the above, whether he wishes to devote a greater, or lesser, proportion of his artillery to counter-battery work. If he over-estimates the support necessary to permit his infantry to advance against the hostile position, it is certain that his infantry will suffer correspondingly higher losses from the concentrated artillery fire of the defence whose artillery positions will have been comparatively neglected.

Whatever decision is made, it is probable that a proportion of the light artillery will be expected to answer N.F. calls up to say 3000 yards in rear of the enemy's advanced positions with a certain proportion of ammunition. This proportion should be laid down in orders, and reserved for the purpose, in addition to that allotted for bombardment tasks. If sections of certain batteries have to leave their bombardment tasks for this purpose, the remainder of the battery must endeavour to fulfil its task by increased rates of fire and sweeping.

The medium artillery on the other hand, whether attached to divisional artillery, or under corps control, may be given infantry support targets in the initial bombardment, but must be considered as primarily intended for counter-battery work. If reliable information is available as to enemy battery positions or areas, the medium artillery might be called upon to neutralise such positions or areas from the start. Failing such information they would have to await definite information from the air, or other sources, before leaving their support targets. It should not be forgotten that hostile battery areas in mobile warfare are apt to be on, or near, roads, and that neutralising fire upon these areas is seldom wasted. Reserves may be marching through or halted near them, but here again, considerations of ammunition supply come in, and the standing barrages formed by neutralising fire on battery areas which were a feature of the battles during the advance in France, in 1918, cannot be effectively repeated in the mobile war which we are considering.

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3. Information.

Even in mobile warfare, it is unlikely in the case of large forces that a decisive attack will be staged on the same day on which contact is first made between advanced troops, unless the advance has been made on such a broad front that divisions are practically deployed and in fighting formation. It may therefore be fairly assumed that there is likely to be a pause of from 12 to 24 hours depending on many circumstances too numerous to mention here.

During this pause, every effort must be made to supplement the scanty information already obtained by the advanced troops and from the air as to the hostile artillery dispositions. Photographs of the suspected artillery areas must be taken if possible and delivered to the C.B.S.O. with the minimum of delay. It is extraordinary how quickly blast marks can be developed, and how easily they can be detected on a photograph. In the "semi-open" warfare period of the advance in 1918 in France, by far the best results were obtained when a complete set of photographs of the corps counter-battery area was taken just before an attack. On one occasion, the writer well remembers that little or nothing was known of the German artillery dispositions after one advance owing to the fact that the weather had been too bad for photographs to be taken. A few N.F's and a few flash-spotting intersections formed the sum total of the C.B.S.O's information just before a very important operation. There was fortunately a break in the bad weather, and, one afternoon, a complete set of photographs was obtained. Within a few hours more than a dozen hostile batteries had been located, chiefly by their blast marks, although they were otherwise well hidden in orchard country. In the attack which followed very shortly afterwards, these batteries were effectively neutralised.

If there is time, the flash-spotting and sound-ranging sections must be given every assistance to enable them to get into action. Any subsidiary operations necessary before the main attack may be fruitful in results to the flash-spotting sections if the hostile artillery can be induced to fire at dusk, or in the hours of darkness.

Generally speaking, however, there is no doubt that the main reliance must be placed upon the information obtained from the air after the commencement of the attack, owing to the fact that

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the enemy's artillery must be given credit for possessing the common sense to change positions which have previously been engaged in the contact period.

4. Control.

Whether the C.B.S.O. will be able to assume control, depends on the length of time available between the contact period and the time of the attack, and also on the co-ordination or not of the attack by the corps commander. Control can probably only be effected through orders as to allocation of a certain proportion of the artillery to counter-battery work as its primary task, and as to allotments of ammunition for the purpose. This will be done through corps artillery instructions and repeated in divisional artillery instructions. Certain batteries must be pushed well forward especially if it becomes apparent that the hostile artillery is sited in great depth. If corps control is not in force, divisional artillery commanders must be prepared to issue special counter-battery orders in their instructions based on the above lines. For the reasons already given, neutralisation programmes on battery positions which have already been engaged in the contact period are liable to lead to a waste of ammunition which can ill be spared in mobile warfare. Such neutralisation should be confined, if ammunition is available at all for this purpose, to batteries which have been clearly located, but which have not yet been engaged. It is again emphasised that the best results will probably be obtained by neutralisation consequent on actual locations after the attack has commenced.

5. The pursuit.

Counter-battery work in the pursuit must be carried out by the divisional artillery and such medium artillery as may be attached to it. Control is at once decentralised, not to be reassumed until the enemy again makes a prolonged stand. Conditions will approximate to those described in the advance in chapter III. Owing to the fact that the hostile rearguards will, if they have been properly constituted, be strong in artillery, counter-battery work is certain to be of great importance in this form of moving warfare. It is the object of the rearguards to make the pursuing force deploy unnecessarily as often as possible. The positions of the rearguard

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artillery will be affected by two opposing factors. These are, first, the desire to make use of its range to the utmost in order to delay the pursuing columns as early as possible, the result being advanced positions; secondly, the natural anxiety not to lose the guns, resulting in their being sited further back than usual. It may be anticipated therefore, that, while the rearguard artillery is certain to be disposed in depth, the tendency will be to find the majority of the guns sited rather far back. This was certainly the case in the German retirements before the armistice in 1918. To reach these guns it will be necessary to take the usual risks attendant on pursuit, and batteries must be pushed right up in consequence. Guns, owing to their longer range, are likely to be of more use than howitzers. The 60 pr. will be particularly useful in the pursuit if it can be got forward.

CHAPTER V.

COUNTER-BATTERY WORK IN THE DEFENCE.

1. Phases of the defensive battle.

If a force has deliberately taken up a defensive position, or has been forced to act on the defensive in an encounter battle in mobile warfare, counter-battery work will be necessary in several distinct phases of the defensive battle. These phases may be briefly described as :—

(a) The period from contact to the assault of the main position, including the fight for any covering positions which may exist.
(b) The fight for the main position.
(c) Counter-attacks, or in certain cases, the counter-offensive.
(d) Withdrawal and rearguard actions.

Each of these phases will now be considered in detail.

2. Period from contact to assault.

Although the artillery of the defence may be inferior in strength, many advantages will tend to rest with it during this period even in a hastily organised position. Its communications, observation posts, battery positions, ammunition supply and control should be better organised and established than those of the attacking artillery. The advantages of the ground will usually lie

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with the defender. Unless the defence is very definitely inferior in the air it should be possible to inflict heavy losses upon the attacking artillery during this period. Every effort must be made to harass and destroy such artillery as may be located so that there will be less support for the attacking infantry when the battle for the main position commences. Every hour that this period is prolonged is to the advantage of the counter-battery organisation, as well as for the general organisation of the defensive position. The occupation of a covering position will therefore generally be an advantage in this respect, as it will tend to delay the attack. As time permits, central control should be attempted. A definite allocation of artillery primarily intended for counter-battery work should be possible, provided that there is a normal allotment of artillery with the defending force. Information will certainly be easier than in the attack. The advantages of ground will favour ground observation, and cross observation can be arranged if time and communications permit. Flash-spotting and sound-ranging sections can be in position according to the degree of haste with which the position has been occupied. The more it appears that a protracted resistance is possible and desirable, the more will conditions approximate to position warfare counter-battery work.

The danger of batteries being overwhelmed by tanks and infantry in the advanced zone of the defensive system precludes the possibility of siting the bulk of the artillery far forward. Range will consequently be lost, and full use cannot be made of long range harassing and counter-battery fire against the advancing columns and the deploying artillery. The solution to this difficulty appears to be to increase mobility so that forward batteries may make good their retreat when necessary.

3. The fight for the main position.

When it becomes obvious that the main assault is being made the chief task of the artillery of the defence will naturally be to stop the attacking infantry and tanks. The whole of the light artillery will probably be absorbed in this task. The artillery of the defence will probably be outnumbered considerably on the actual front of attack. It will also probably be severely neutralised in consequence, especially if the attacking aeroplanes have temporary superiority. Opportunities will however occur, possibly

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with ground observation, to engage the attacking close support artillery which must inevitably undergo certain risks in the course of the attack. Such opportunities must not be wasted. During any pauses in the attack, as for instance, on intermediate objectives, every effort must be made between successive assaults to engage the attacking artillery once more. It will be particularly vulnerable if located from either ground or air during changes of position.

4. Counter-attacks.

In counter-attacks it is particularly important to carry out vigorous counter-battery work. There were many instances in the late war of the failure of counter-attacks which were literally blasted off the face of the earth by overwhelming concentrations of artillery. It is true that such concentrations are normally impossible in mobile warfare owing to lack of guns and ammunition, but the principle remains good that no counter-attack is likely to succeed against an enemy powerfully supplied with artillery unless effective counter-battery work is carried out. The troops which are being counter-attacked may have had no time to organise strong defences. They may still be disorganised, tired, and possibly somewhat shaken and demoralised by heavy losses. There is therefore not the same need as in the ordinary attack for heavy, direct artillery support against their positions, particularly if tanks are taking part in the counter-attack. Their artillery, on the other hand, may be in their original positions comparatively unshaken and, as has been suggested, are capable of stopping the counter-attack dead unless they are subjected to heavy neutralising fire. In this connection, direct action by low-flying aeroplanes with machine-gun fire and bombs may be very effective in support of counter-attacks in mobile warfare.

5. Withdrawals and rearguard actions.

Once the withdrawal has commenced, and in the subsequent actions of rear guards, central control is impossible owing to the fluid state of communications and frequent changes in position. Control will be decentralised, passing to the commanders of the artillery attached to rear guards. There will be a real shortage of information which will probably be limited to that obtained by aeroplanes and artillery ground observers. Sound ranging sections

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cannot be risked in rearguard actions. They must be sent back to the next main position where a stand is to be made in order that they may be ready in time. There should be no shortage of ammunition however, as dumps can be arranged in each successive rearguard position which is to be occupied. The conclusion is that counter-battery work with a rear guard is difficult, and it will only be a minor task of the artillery, whose main objects will be to delay the enemy's infantry by forcing deployments at long ranges.

CHAPTER VI.

CONCLUSIONS.

1. Summary.

The following is a summary of the more important conclusions which emerge from a study of the problem of counter-battery work in mobile warfare :—

(1) Effective aeroplane co-operation is absolutely essential. Artillery aeroplanes must be used for artillery purposes. Valuable trained personnel must not be wasted in tasks which could be carried out by pilots and observers who are untrained in artillery work.

(2) A "blind period" will nearly always exist after contact is first made. This must be shortened by rapidly utilising every source of information. Infantry and other arms must be trained to assist in the collection of counter-battery information.

(3) Lack of rapid and reliable communications will form the stumbling block in the dissemination or collation of the above information. The C.B.S.O. must be allotted efficient means of communication.

(4) Central control by the C.B.S.O. is only possible in the defence or in an attack co-ordinated by the corps staff after the advance has been definitely held up. Even then it is largely dependent on the rapid installation of an effective system of communications.

(5) Owing to the increased necessity for control of counter-battery work by the divisional artillery commander in mobile warfare, it is considered that the staff of the C.R.A.

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should include an officer specially trained for the purpose. His duties would primarily be to assist the brigade-major in everything connected with counter-battery work. He would be particularly useful in the collection and collation of counter-battery intelligence in the advance, or during periods when central control by the C.B.S.O. was impracticable.

(6) Allocation of artillery to counter-battery work is a very difficult problem. It can only be decided after a careful consideration of the many factors concerned. It will rarely be possible in mobile warfare, except when central control exists, to allot artillery to counter-battery work alone. Light artillery must take a larger relative share in counter-battery work than it was accustomed to do in trench warfare when there was ample medium and heavy artillery available.

(7) Ammunition supply will be strictly limited. Destructive shoots on anything approaching the scale attempted in trench warfare will be quite out of the question. Short, violent concentrations from as many batteries as possible will be arranged where control and communications permit. Batteries in the open which can be ranged upon by ground observation will, on the other hand, be engaged by individual batteries to avoid confusion in ranging. When central control exists, orders should be issued as to the amount of ammunition to be normally fired in answer to calls from the air.

2. *General conclusions.*

Time is an all important factor in this, as in all other aspects of mobile warfare. Rapidity in thought, decision and action are the requisites for the development of sound counter-battery work. Promptness must be the quality which permeates the whole artillery organisation. Without this quality there can be no doubt that many opportunities for inflicting losses on the hostile artillery will be missed. The artillery may thus, directly or indirectly, fail in one of its primary objects, namely the protection of the infantry from hostile artillery fire. The overwhelming effect of artillery fire on

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infantry must not be lost sight of in peace. The subject of counter-battery work must not be allowed to slip into the background. The lessons of the Great War in this respect should be handed on to junior officers of all arms—not only to artillery officers. Infantry officers especially must be taught how to co-operate in obtaining and forwarding counter-battery information. But, above all, the artillery must be taught promptness and accuracy so that it may take the field as a quicker thinking, quicker acting and harder hitting organisation than its opponent.

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THE STAND AT LE CATEAU, 26th AUGUST, 1914.

By Brig.-General C. De Sausmarez, C.B., C.M.G., D.S.O.

ALTHOUGH much about this subject has been written, more and more will probably be added as time goes by. There are several reasons for this, of which the chief is that students of military history are beginning to know the details of the 1914 campaign; and the more thoroughly conversant the man of average intelligence becomes with the facts as narrated by the historian, made clearer by a study, map in hand, of the actual ground, the more does he speculate as to the reasons for such and such a decision and the more severe are his mental strictures on some apparent failure to grasp an opportunity or seeming neglect of an elementary principle in minor tactics. He is apt, in his accumulated knowledge of historical facts, to regard the commander on the spot as having been as fully acquainted with every item as he is himself and to judge him accordingly.

Regarding the question whether General Sir Horace Smith-Dorrien's decision was justified or not, some will come to one conclusion and some to another, while others will hover between the two. The opinion of some officer who was with the I Corps may carry weight, hinting that the stand was unnecessary, pointing to the ease with which the I Corps slipped away, and asking why the remainder of the force could not do the same. Or possibly another officer of the I Corps will create quite a different impression by saying, "As we marched off and got away, we did feel grateful to those fellows for covering our retreat so splendidly." Both of these divergent opinions have actually been expressed by distinguished officers who fought in the I Corps in the summer of 1914. Curiously enough, neither of them give a true picture of what actually occurred.

To an officer of the II Corps who had the privilege of fighting under General Sir Horace Smith-Dorrien this subject has always been of the keenest interest, any available writing thereon in the public press or elsewhere having been eagerly read. There was a

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fine leading article in the *Times*, when that newspaper published the advanced extracts from the General's book which dealt with Le Cateau and other incidents of his career in France. This article drew attention—and rightly—to the fact that the late Lord Ypres by countenancing the decision of his "great subordinate" to stand and fight, shared with him the credit of crippling the German pursuit. On the other hand, in a review of the book in the *Sunday Times*, Mr. Herbert Sidebotham asserts that the opinion that "the battle was unnecessary, a waste of life, and dangerous to the safety of the army" will be "generally accepted." One wonders how and whence this writer got this view and how much real study he has given to the subject. He may be a most distinguished journalist, indeed a perfect archangel of journalism, but it is remarkable how angels will sometimes rush in where the ordinary fool would fear to tread. Why, it will be asked, does not the present writer fear to tread that path, even though it be in an angel's footsteps? Perhaps it is because his folly is extraordinary.

The following brief attempt to deal with a thorny subject, after a study of Brigadier-General Edmonds' Official History and Major A. F. Becke's book entitled "The Royal Regiment of Artillery at Le Cateau," is made by one who saw something of the condition of the troops on the 25th August, 1914, who had the honour of fighting in the battle on the 26th, and who has lately had the great advantage of attending a most interesting and instructive staff tour on the battlefield.

With regard to the two books above mentioned the Official History is invaluable to anyone who is trying to master all the facts. It is probably far more interesting to the real student than to the casual reader, who cannot be bothered with so much detail. Some gifted people have marvellous memories, but the average man must read and re-read with the map General Edmonds' account of the events leading up to any one battle, of the battle itself and of its immediate consequences. Tackled in this fashion the book is not only invaluable as an instructional guide but of absorbing interest.

Major Becke's is a wonderful book, published as it was at the beginning of 1919, two months after the armistice. Not only do we find a clear narrative and sound and instructive comments, but parts of the book form an epic. At first sight we are inclined to

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grumble at the number and length of the footnotes, but when fairly launched we clamour for more and more footnotes, such as those which portray the deeds of the field batteries of the 5th Division. Although in the light of subsequent information we may not agree with one or two of the deductions made by the author, we cannot but admire a treatise, on the whole so sound and well-reasoned. He is perhaps a little hard on von Kluck when he says that he was merely a *bon général ordinaire*. It must be remembered that this general was himself a subordinate; that he was misled by a report from the German Supreme Command as to the direction of the British Line of Communications; that information to be gleaned from air reconnaissance was comparatively meagre at that early stage; and that he had immediately opposed to him in the British Commander-in-Chief and his two Corps Commanders three tried leaders of a fighting type as great as that of the men whom they commanded. The wonderful march performed by the German First Army, interrupted as it was by severe fighting, seems proof in itself that von Kluck was a leader of a high order. It is hardly correct that he did not attempt to organise a pursuit after Le Cateau. A considerable portion of his pursuing troops, the 2nd Cavalry Division and part of the 9th Cavalry Division, of von der Marwitz's II Cavalry Corps, had been badly handled by the British 4th Division on the 26th August and were hardly fit to move that day; the remainder of this corps were opposed to, though not severely engaged with, the British 3rd Division in the centre. von Kluck's orders for the 27th were that the II Cavalry Corps should advance in front of the German right flank and hinder the British retreat. Had he had cavalry available to intervene on the British right flank the story of Le Cateau might have had a less successful ending. At about 3 p.m. German cavalry were actually seen from one of our battery observing posts, moving south on the high ground west of Landrecies. The visibility was not good, there were other pressing affairs of the moment which prevented anything like an accurate computation of the numbers, but it is estimated that there was at least a regiment and possibly a brigade. To whom did they belong? They may have been the cavalry of the German III or IV Corps, and probably the rôle assigned to them by their Corps Commander was to watch the western flank.

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To return to Mr. Sidebotham; this writer goes on to say, "After the Mons front had been abandoned owing to the defeat of the French right, the only thing to be done was to retreat to the new front with as little delay and loss as possible. Haig did it, and Smith-Dorrien, although his position was the more dangerous, might have done it too."

So far as these two generals knew up to a fairly late hour of the afternoon of the 25th, the portion of the "new front" to be held by the B.E.F. was the "Cambrai—Le Cateau" position. At a little after 3 p.m. on the 25th the G.O.C. I Corps received at Landrecies a message from G.H.Q., asking when he could take up his allotted portion of this position, Inchy to St. Benin. His troops were then for the most part still on the march on the east of the Forêt de Mormal. The G.O.C. II Corps, knowing that the I Corps was delayed, issued instructions for the temporary occupation (in addition to his own front) of a portion of the front destined to be occupied by the I Corps, and one and a half battalions of the 14th Infantry Brigade which was rear guard of the 5th Division, were sent to the east of Le Cateau after they had come in at 6.30 p.m. At that time the 7th Infantry Brigade (rear guard of the 3rd Division) and the 4th Division (of which the bulk of the infantry and one brigade of artillery, having detrained at Le Cateau on the 24th, had been sent by G.H.Q. to the neighbourhood of Solesmes to cover the retirement of the II Corps) were still a long way off, fighting, or in a position to fight, a delaying action some miles to the west of the Forêt de Mormal.

The first indications of a change of plan were received by the G.O.C. I Corps through his senior general staff officer, who had motored from G.H.Q. with instructions that his command should march, the 1st Division to St. Martin, 5 miles south of Le Cateau, the 2nd to Bazuel, 2 miles S.E. of that town. He issued orders for the march to begin at 2 a.m. on the 26th. The G.O.C. II Corps, in a private note timed 3.45 p.m. from the Deputy Chief of the General Staff, was told that orders for a further retirement would reach him later.

It was not till a considerably later hour that the I Corps received the written order to continue the retirement on the 26th, and this

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operation order, though it indicated the same south-westerly direction as did the instructions received through the senior general staff officer, laid down that the retirement of the I Corps should be carried out as far as Busigny, 7 miles S.S.W. of Le Cateau. At the time this order was received the 5th Infantry Brigade of the 2nd Division, which eventually passed the night of the 25th-26th at Noyelles, had not even then arrived near its destination. The 4th (Guards) and 6th Infantry Brigade (both of the 2nd Division) had arrived at Landrecies and Maroilles respectively. The 1st Division was in billets to the east, at Dompierre, Marbaix and Le Grand Fayt. In the same operation order G.H.Q. directed that the II Corps should retire to Beaurevoir (exclusive), Prémont and La Sabliere, and the 4th Division to Beaurevoir and Le Catelet. This order reached the G.O.C. II Corps at 9 p.m., and he issued orders accordingly that the transport should march at 4 a.m. and the main bodies at 7 a.m. on the 26th. The 7th Infantry Brigade, with the brigade of artillery which also belonged to the 3rd Divisional rearguard, had not even then arrived in bivouac. The 4th Division were still further behind.

The evening and night of the 25th-26th were disturbing for the I Corps, as fighting developed between a detachment of the 6th Infantry Brigade and a small mixed force of the enemy a mile or more to the N.W. of Maroilles, which petered out soon after dark; and between the 4th (Guards) Brigade and a larger enemy force just N.W. of Landrecies, which lasted until past midnight. The appreciation of the situation at I Corps Headquarters seems, very naturally, to have been that the enemy was attempting to penetrate between the British I and II Corps, that the left flank of the I Corps was already threatened, and that an attack from the west and north-west was to be expected in the morning. Had the G.O.C. been acquainted with the facts that are now known to us, this appreciation would have been very different. We now know that the troops near Maroilles belonged to the German III Corps who had orders to march next morning via Landrecies (north)—Le Cateau to Maretz, with a view to the envelopment of the British right flank on the Le Cateau position; and that those near Landrecies belonged to the 7th Division of the German IV Corps who had orders to march to Montay with a view to striking the right centre of the

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British Army, and holding it to its ground. In both cases the contact was fortuitous, the Germans having merely spread themselves to obtain billeting room. The first contact at Landrecies seems to have been with the escort of some regimental transport which had been ordered to pass the column in order to get into billets.

Of course none of these details were known at Le Grand Fayt, where our I Corps Headquarters were spending the night. They merely had information of contact with the pursuing enemy at two points on a line running roughly N.E. to S.W. These indications were ominous and it must have looked as if an attack against the left flank were to be expected from the German First Army, sufficiently big to hold the British I Army Corps until the Second German Army should come down like a wolf on the fold from the north. If this appreciation of the situation had been correct, then it would have been rash to attempt to march to the S.W., across the front of the enemy's attack from the N.W.

It is not definitely known whether the appreciation above indicated was actually made at Le Grand Fayt on the night of the 25th-26th, but if (as seems most natural and probable) it was, it accounts for the retreat of the I Corps being carried out in a southerly direction to Etreux instead of a S.W. direction to Busigny as ordered by G.H.Q. Had the Germans not "blundered on to" them (to use Major Becke's expression) near Maroilles and Landrecies, the I Corps would probably have marched at 2 a.m. to Busigny; and, so far as can be gathered from the Official History, it seems most probable that the whole of the 2nd Division, from Noyelles, Maroilles and Landrecies, would have got clear as easily to the S.W. via Ors or Catillon, as did in fact the 4th (Guards) Brigade, retiring due S. in the very early morning from Landrecies.

No doubt Sir Horace Smith-Dorrien expected that the I Corps would attempt to retire to Busigny, as ordered by G.H.Q., and he feared for their fate if he did not stand to cover their retirement.

The dispositions of the I Corps for the 26th were briefly as follows. The 1st Division took up a position near Favril and on its left flank the 4th (Guards) Brigade, starting before dawn, retired due south without molestation. The 5th and 6th Infantry Brigades retired by the right flank, and owing to congestion on the road the 5th Infantry Brigade was very late. The retirement of the 1st

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Division began at 1 p.m., actually before the 5th Infantry Brigade had passed them, but they did not reach their billets at Fesmy and Oisy till 10 p.m. The 5th Infantry Brigade eventually halted for the night at Barzy, 5 miles N.E. of the bulk of the 2nd Division at Etreux.

So great was the delay in the retirement of the 5th Infantry Brigade that the rear-guard, the 2/Connaught Rangers, was actually engaged with troops of the German I Cavalry Corps and Second Army, who made prisoners of about 100 of our men. This incident gives some indication of what might have happened had the German First Army attacked our I Corps in flank from the west. Supposing, for the moment, that they had actually done so, what would have been the fate of the I Corps? General Haig would have been compelled in effect to stand and fight; he might have halted the 4th Guards Brigade on its march southwards, and used it in a counter-attack to prevent envelopment. We may be sure that the I Corps would have put up as good a fight as did Sir Horace Smith-Dorrien's command, but the odds against them would have been terrific, with the German First Army holding them until the Second Army should arrive from the north, von Richthofen's cavalry being employed, perhaps, in getting round to their rear by the right flank. The odds against General Smith-Dorrien were big enough, but small compared to those with which General Haig would have had to contend, had the German First Army attacked his command instead of General Smith-Dorrien's.

If the II Corps, 4th Division and cavalry had retired in accordance with the orders of G.H.Q., the I Corps would in all probability have ceased to exist. Would the II Corps Commander then have received a pat on the back from some kind journalist, the I Corps Commander being duly censured for not getting back to the "new position"?

The case of the I Corps would not have been so hopeless with the Le Cateau position held, because a German attack from the west would perforce have been half-hearted, and the I Corps, though perhaps badly crippled, would have contrived to avoid envelopment.

Had Sir H. Smith-Dorrien's troops been fresh, un-wearied and free from battle casualties, it is not unlikely that G.H.Q. would

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have ordered him to cover the retirement of the I Corps, without any suggestion on his part that he should do so. It must, however, have been known at G.H.Q. that his troops had had severe fighting on the 24th, that their casualties had been large, that they had had little rest for five days, and that they were probably short of food. The operation order directing both corps to march S.W. was probably drafted with the intention of keeping the two corps as near together as possible. It said little or nothing about co-operation, though no doubt the hope was that by marching on parallel routes at no great distance from one another, one corps would be able to help the other should the need arise. Whether the consideration of the wearying and trying conditions imposed on the II Corps, their casualties, their constant fighting and marching, induced G.H.Q. to ask nothing further of them we do not know, but we do know that these very conditions, coupled with the fact that the enemy were on their heels, were the compelling reason for the stand made at Le Cateau.

In the early morning of the 25th, the day before the battle, it happened that the 108th Heavy Battery was a long way back in the 5th Divisional Column, marching down the Roman Road to the west of the Forêt de Mormal. Orders had been issued for a unit of the 14th Infantry Brigade to halt and go back on their tracks to reinforce the rear-guard or relieve the rear party. As they streamed past the battery it was pitiful to see the men's faces, dirty, starved of food and rest, and desperate at the idea of more marching to be done and ground already covered once to be covered again and yet again. To add to their misery the weather was extremely sultry and the forest shut out any breeze there might have been. An infantry officer informed the battery commander that he had been ordered to hand over a platoon as escort to the battery, and added that the men were dead-beat and faint from want of food. "If you give them something to eat," he said, "they'll fight damned well for you, provided they haven't to move far." Fortunately, the battery had helped itself on the previous day to biscuits and bully as well as oats from a deserted supply dump, and the men were only too glad to give a square meal to their comrades, who, loaded with rifle and pack, and desperately hungry and tired, were in a bad plight. But the infantry officer's words were true, and what is more his description was typical of most of the infantry.

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There was the situation in a nutshell; they were ready to go on till they dropped, but were in imminent danger of dropping; give them a chance to halt and have a bit of food, and they would cheerfully fight while they rested. And this was the morning of the day before the battle, and they had many weary miles to cover before reaching their bivouacs on the Le Cateau position. If an infantry officer who fought at Le Cateau is consulted on the subject, he will almost certainly say that his men could not have continued the retreat in the early morning of the 26th; that they had more than a little sting left in them while they rested their legs in battle during that day, the Germans would doubtless confirm.

We know from the Official History and from his own account that when General Smith-Dorrien between 2 and 3 a.m. on the 26th considered the condition of his infantry and the fact that several of the II Corps units, and practically the whole of the infantry and some of the artillery of the 4th Division had not even then arrived in bivouac, he was faced with a very difficult problem. How could he best carry out the orders received from G.H.Q., which, as we have seen above, were to retire to Beaurevoir and La Sabliere? To retire at once, or as soon as those troops who were on the position could be got ready, was unthinkable. How could those who were still wending their way to the position with the enemy on their heels be left behind? And yet the Cavalry Commander told him that unless he could get on the move at once it would be necessary to fight next day, the cavalry being too much scattered and their horses too beat for them to be of the smallest value in covering the retirement of the force.

He had therefore one of two choices left to him, either to act in accordance with the orders he had already issued, but giving a bigger proportion of artillery to his rearguards, or to fight with his whole force in the hope of striking the enemy such a blow as would cripple their pursuit.

The orders that he had already issued detailed one infantry brigade and two artillery brigades per division, with the cyclist company and divisional squadron, as rearguards. (So far as concerned the 5th Division each of the three artillery brigades was affiliated to an infantry brigade, and the howitzer brigade and the heavy battery were to be under the control of the C.R.A. It seems

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therefore as if the intention was that the two artillery brigades who should form part of the rearguard were the 18 pr. brigade, affiliated to the 13th Infantry Brigade (which was detailed for rear-guard duty), and the howitzer brigade, the heavy battery being added; whilst the other two 18 pr. brigades were also in a position to act should the infantry brigade to which they were affiliated be compelled to fight before leaving the position. It was evidently contemplated by the G.O.C. 5th Division that a fight might be necessary before evacuating any part of the line.)

The first alternative, to leave a brigade of infantry per division and the bulk of his artillery to cover the retirement of the remainder of the force, was (if it ever occurred to him) rejected by Sir Horace Smith-Dorrien, and he decided on the second alternative, to fight with his whole force. Let us try to picture what would have happened if the first alternative had been adopted.

Dealing first with the right flank the action would have begun in the same manner, and one and a half battalions of the 14th Infantry Brigade, who were preparing to march off from Le Cateau would have been caught in exactly the same unfortunate way as actually happened. They and the remainder of the 14th Infantry Brigade would have eventually retired, probably with considerable casualties from artillery fire; the number of stragglers would have been large. The 15th Infantry Brigade would have retired, no doubt with fewer casualties, for the Germans did not attack them seriously in the early part of the day. The 13th Infantry Brigade which was in the centre of the 5th Division would have been isolated with strong enemy forces attacking their front and right flank. Their fate would probably have been annihilation.

Turning to the left of the line, the whole of the 4th Division would have perforce been engaged at the beginning of the action, for the infantry had not long arrived on the position from Solesmes before they were attacked by German cavalry, horse artillery and jägers. If the two brigades had marched off, the German cavalry would quite possibly have got round to the rear of the remaining brigade which would have been mopped up by the German IV Reserve Corps on its arrival. They would have learnt that the true direction of the British retreat was to the south rather than to the west, and von Kluck's wrong impression would have been removed.

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It is possible that the rearguard brigade of the 3rd Division in the centre would have made good their retreat, but not without serious loss. At least one of the other two brigades would have lost fairly heavily. The number of stragglers throughout the whole force would have been very large.

Taking it all round we may be sure that the infantry casualties alone would have been as great, if not greater, than 8000, the approximate total number which occurred in the actual battle. It is possible that the loss in guns would have been trifling, or at all events much less than the actual loss.

As regards the Germans, we know that their casualties were very heavy. Our infantry fully maintained, as they did at Mons, their 600-year old reputation as individual marksmen. If our force had been deprived of two thirds of its infantry strength the German casualties would have been insignificant compared to those which they actually suffered. They were so badly hammered that the First Army lost its grip of the B.E.F. and never regained it. With only one-third of the rifle power against them this would not have been the case. Instead of reeling from the blow inflicted on them they would have been in a position not merely to move forward, groping, after they had recovered from the shock, but to maintain a vigorous pursuit and to compel the II Corps and 4th Division to stand and fight before they had crossed the Oise.

It is of course a mistake to dogmatise concerning the consequences of a suppositious happening, but it is not unreasonable to assume that the battle of the Marne would not in these suppositious circumstances have been the victory for the Allies, which in truth was the case. The German sledge-hammer plan of moving ruthlessly forward, each column attacking and knocking out everything that withstood it, came perilously near to success as it was, but the machine was thrown out of gear by the blow it received at Le Cateau, which was one of the chief causes of the war not being won by the Germans off-hand, "according to plan." Had this blow not been dealt and had the German machine not been thereby thrown out of gear, it is unpleasant even to contemplate what might have happened.

That all the tactical dispositions for the battle were perfect and could not have been improved upon, no one who has studied the

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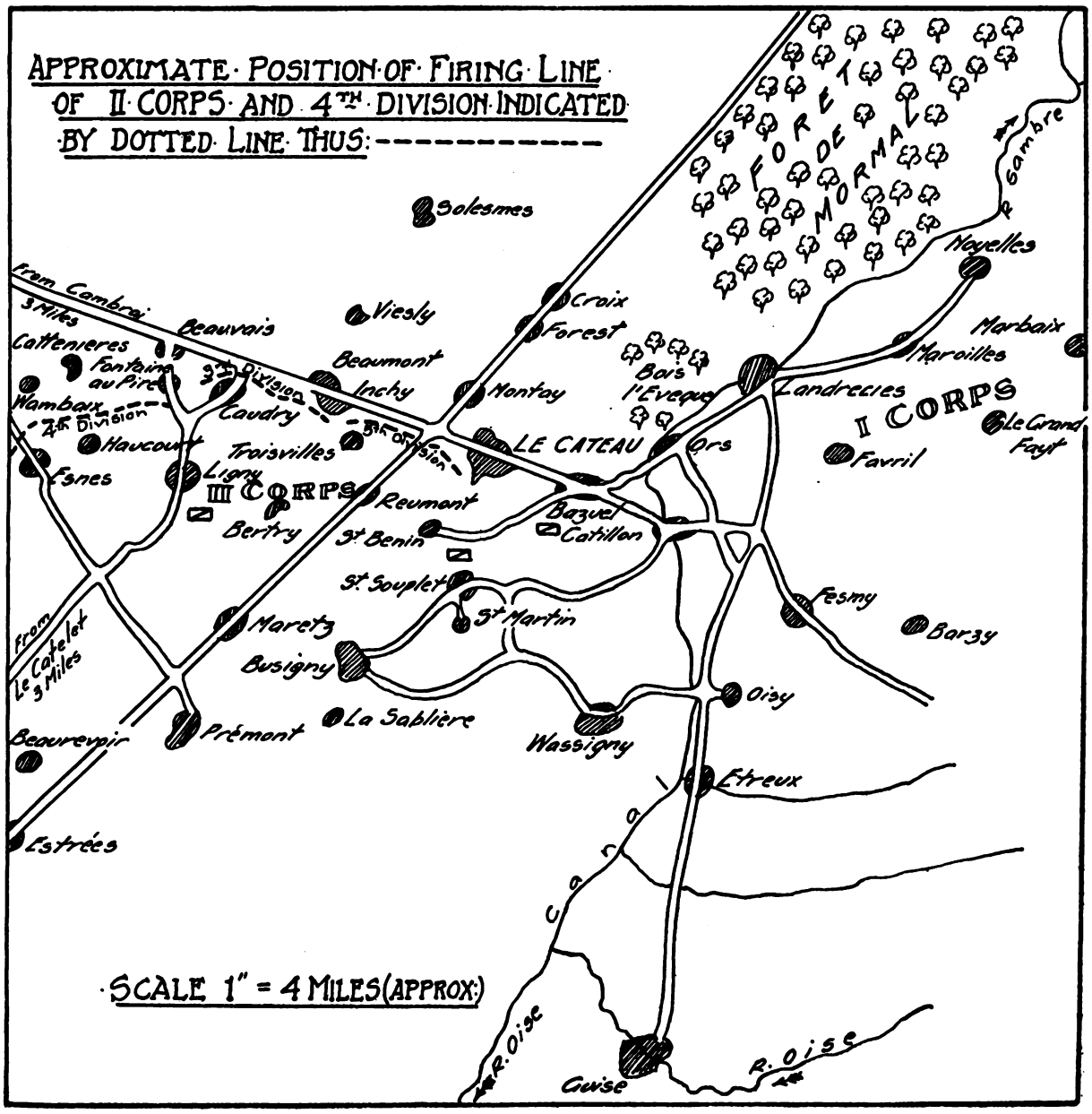

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subject seriously could possibly assert; but it is contended that the strategical conception of the battle was the correct one, and that General Sir Horace Smith-Dorrien made a great and right decision, when he determined to stand and fight.

It was owing to force of circumstances that this decision was made with so very little time to spare, and that the Germans were able to attack before the British troops on the right flank had received orders not to retire. It is difficult to see how orders could have been communicated more quickly. If, immediately after the Corps Commander announced his decision to stand and fight, a message had been sent to the G.O.C. 5th Division telling him to insure above all things that his troops on the right flank were ready—not to retire—but to fight a defensive battle, it is conceivable, but doubtful, that arrangements could have been made in time for the one and a half battalions who were on the east of Le Cateau to be in position covering that town, and for the remainder of the 14th Infantry Brigade to occupy a more suitable position than that which they actually took up.

It was, however, an inspiration which caused a later order, to the effect that there was in no circumstances to be a retirement, to be issued for communication to all units. This order, at all events so far as concerned the 5th Division, was so firmly impressed on all units that two of them, the 2/Suffolk Regiment and the 2/K.O.Y.L.I., sacrificed themselves for the remainder of the force.

When, in the early afternoon, it was decided to break off the action, the orders to retire, presumably owing to the fact that the abnormally heavy fire prevented any message getting through to them, failed to reach the two battalions named above. They saw other troops retiring, but in spite of this held their ground because nothing had reached them cancelling the previous order that there was to be no retirement. Anyone privileged to read the diary of Major (now Lieut.-Colonel) Peebles who, owing to the death of his C.O. and to the second in command being severely wounded, commanded the 2/Suffolk Regiment at the end, will learn a story of devoted heroism, which loses nothing from the simple language used in its telling. He apparently did not know that all units had had similar injunctions not to retire, and assumed accordingly that it was the intention that his battalion should be sacrificed. He,

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therefore (as did Lieut.-Colonel Bond who commanded the battalion of Yorkshire Light Infantry on the left of the Suffolk Regiment), calmly accepted the principle that it was "expedient that one man should die for the people." They both assumed that their battalions were cast for this rôle, and unhesitatingly sacrificed them, and (incidentally) their own future prospects. They have some consolation in knowing that their action was invaluable, and that though they missed all further chances of honour and advancement through being prisoners of war, their names should live longer in history than those of many who were more fortunate.

These are the two outstanding instances of what may be called "accidental rearguards," but there were other examples in the 3rd and 4th Divisions of detachments whom the order to retire never reached, and who fought on stoutly, and caused consternation and delay to the enemy. To one and all we owe our gratitude, but we must not forget to be thankful for the inspiration which caused the special order to be issued which forbade any retirement. Supposing that the decision to stand and fight had not been made, it is quite conceivable that owing to the local situation at their respective positions the two infantry brigades per division would not have retired at once, and that the battle would have actually begun as it did, with all the troops engaged. If they had not had the special order that there was to be no retirement, it would have been understood that the main object was to retreat and not to fight, and the blow given to the Germans would have been trifling compared to that which was actually struck.

It is interesting to speculate as to the probable effect on the battle, if the I Corps had carried out the orders of G.H.Q. and marched at 2 a.m. S.W. to Busigny, instead of retiring in a southerly direction. There seems every reason to believe that one or more Infantry Brigades with a quota of artillery would have arrived within two miles of Le Cateau by 7.30 a.m., and would have been able to launch that counter-attack against the German left flank which General Smith-Dorrien longed, but owing to lack of reserves was not able, to deliver. Reinforcements would have kept coming in on his right, and Le Cateau might have been a tactical as well as a strategical victory for the British arms. It was indeed a misfortune that the Germans "blundered on to" the I Corps at Maroilles and Landrecies.

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The German plan of advancing in numerous columns, attacking wherever opposition was met and never stopping, must have formed part of the military creed of all ranks from general to private. They were taught to believe that this was the only sure road to victory. With their numbers, their iron discipline, the bravery and physical fitness of their troops, they came near to justifying their creed. It is pleasant to think that they were taught at this early stage that the British Army of 1914 was good enough to thwart them, and we may be thankful that Sir John French's "Great Subordinate" recognised this important fact, and utilised his knowledge by standing up to them and striking them a crippling blow, instead of retiring with those of his troops who could march, and leaving the remainder to their fate.

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ARTILLERY BRIGADE TACTICAL EXERCISES.

By Bt. Lieut.-Colonel E. C. Anstey, d.s.o., R.A.

III. ADVANCED GUARD.

Opening Situation.

A Northern Army is advancing southwards with three Divisions and one Cavalry Brigade leading, with the object of reaching an east and west line through Sidbury Camp by evening. The Centre (2nd) Division is advancing by the roads and tracks in Sq. M 49—west of Milton Hill Farm—Milking Bushes on Everley, with orders to establish lateral communication with the neighbouring Divisions (which are advancing down the valleys of the Avon and Bourne respectively) on the line Lidbury Camp (M 03)—Upper Everley—Gore Down. The 2nd and 3rd Divisions have arranged that touch will be made by their leading units at Hazleberry Plantation, which is inclusive to 3rd Division.

The Cavalry Brigade has been sent ahead to occupy the high ground Pewsey Hill (Sqs. M 18 & 28)—Milton Hill (M 38)—Easton Hill, which they did without opposition. At 0900 hours the 2nd Divisional advanced guard commander, who, together with his vanguard commander, artillery brigade commander and tank company commander, had joined the Cavalry Brigade commander on Milton Hill, has appreciated the situation in the light of all the information at his disposal (which includes air as well as cavalry reports) and has come to the following conclusions:—

Our Cavalry have established themselves securely near the pond on Pewsey Down—in Winter's Penning (M 27)—amongst the Old Chalk Pits (M 27)—in Tumuli (M 4082)—about Tumulus (M 5080)—and in Hill Barn (M 59). The cavalry brigade commander has sent his left regiment orders to occupy Crowdown Clump (M 5880). One squadron has pushed well down into

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EVERLEY ASHES and reports they have checked approaching parties of the enemy near MILKING BUSHES and on COW DOWN. One of our patrols was driven off AUGHTON DOWN and was fired on from the SCRUBS. The cavalry brigade has orders to concentrate N.W. of PEWSEY HILL as soon as relieved by the infantry of the 2nd Division.

The enemy was thus forestalled by us on the high ground we are now on. He has rushed up not less than two cavalry regiments and a battalion of infantry in lorries with guns following by road now perhaps three miles away from EVERLEY. The infantry has debussed in EVERLEY. The cavalry are reconnoitring our position with caution since one of their leading squadrons was caught in the open by one of our m.g's and severely cut up. Some of the enemy cavalry appear to be in position on the south slopes of AUGHTON DOWN. Two long columns of all arms are following, heads of which were about eight miles south of SIDBURY CAMP at 0840 hours.

The 2nd Division vanguard is now half a mile N. of the northern edge of the map. It can reach the crest of the hill at M 4195 at 0930 hours: the head of the mainguard will reach the same point at about 1010 hours. I expect the enemy's infantry are placing EVERLEY and possibly WINDWARD BALL PLANTATION in a state of defence and that he has only cavalry in the woods to the north. The task of the vanguard will be to clear these woods down to the MILKING BUSHES—Tumulus (M 4757) road. The cavalry brigade commander has arranged to reinforce his squadron in EVERLEY ASHES and to hold that wood until the vanguard has cleared the remainder of the woods and can relieve them. I must then secure WINDWARD BALL PLANTATION and MARLBOROUGH ROAD PLANTATION with the 2nd K.O.Y.L.I. For various reasons I decide that I will next secure HILLS 170 (M 24) and 160 (M 54) with the 3rd K.O.S.B. and 4th S.W.B. respectively and finally attack EVERLEY with the K.O.Y.L.I. probably with the help of a flank attack from the direction of LOWER EVERLEY. Tanks will probably assist the attack on LOWER EVERLEY and HILL 170.

The order of march of the Advanced Guard is as follows:—

Vanguard (in order of march).

Commander—Lt.-Col. Andrew. 1st Bn., D.C.L.I.

1st Bn., D.C.L.I.

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1 Section Pack Battery (3·7″).
13th Field Battery, R.A.
1 Section Field Company, R.E.

Mainguard.

6th Infantry Brigade H.Q.
2nd Bn., K.O.Y.L.I.
1st Pack Battery (3·7″) (less 1 Section).
4th Field Brigade, R.A. (less 1 Battery).
6th Field Company, R.E. (less 1 Section).
3rd Bn., K.O.S.B.
4th Bn., S.W.B.
5th Field Ambulance.
Portion of Section of No. 1 Company Divisional Train.
1 Section Tanks.

The advanced guard commander at 0910 hours asks Lt.-Col. Gunner (O.C. 4th Field Brigade, R.A.) how he proposes to support him.

It must be understood that Lt.-Col Gunner has been taking part in the advanced guard commander's reconnaissance and assisting him in the formation of his plan. Lt.-Col. Gunner therefore does not have to begin an appreciation *ab initio*. Most of the factors are already present in his mind but they require reviewing from an artillery aspect. Consequently in practice the formation of an artillery plan does not take so long as may appear from what follows. In the full appreciation which, for the sake of clearness, will now be given, considerations that have already presented themselves during the advanced guard commander's reconnaissance are printed in ordinary characters. The additional artillery factors and deductions that fall into place in the artillery commander's rapid mental review of the problem are printed in italics. Thus the whole structure of the appreciation cast into an artillery setting, takes shape as follows:—

My objects are:

1. *To assist the vanguard to clear the woods north of* WINDWARD BALL PLANTATION.
2. *To support attacks on* WINDWARD BALL PLANTATION.
3. *To support attacks on* HILLS *170 and 160.*
4. *To support attack on* EVERLEY.

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5. *To assist in the consolidation of the ground gained or to be ready to assist a further advance.*

2. As regards the enemy in the woods north of WINDWARD BALL PLANTATION, his cavalry have had no time to organise defence : positions and M.G. co-operation must be haphazard : also artillery support must be hastily arranged by the enemy when it arrives about 0945-1000 hours. (N.B.—*These guns may be expected to be in action near* WEATHERHILL *or* SNAIL DOWN *(M 52).*) But a back position on AUGHTON DOWN may be a little awkward to dislodge him from. The vanguard guns should be sufficient. *But meanwhile* EVERLEY ASHES *needs artillery protection and the attack on* AUGHTON *might want more help. Therefore I will support the vanguard with one more 18 pr. battery.*

3. WINDWARD BALL PLANTATION is well withdrawn behind a crest with good short field of fire and difficult for us to range on except near WIREN COPSE. 1300 yds. long. But also difficult for enemy to arrange artillery covering fire hastily; our approaches blind to him except over WEST EVERLEY DOWN and ROUND DOWN; difficult for his m.g's to co-operate except by fire on ROUND DOWN from direction of HILL 170. Our attack will evidently be made from the north. *The salient of* WIREN COPSE *will flank such an attack by us to some extent.* The only view of our own infantry is obtainable from direction of Tumuli (M 2869). Cannot guarantee fire on north edge of PLANTATION will be accurate. *Left of our infantry will be closer to enemy than the right.*

Conclusion. Will put howitzers on WIREN COPSE; *and make 18 prs. fire as obliquely as possible on remaining edge of* PLANTATION *to minimise effect of inaccuracy, treating eastern half for say 2 minutes after zero and then switching to western half for another 3 minutes. Total expenditure, hows. 6 rds. per how.; 18 prs. 30 rds. per gun. Guns and O.P's towards Tumuli and* WINTER'S PENNING *area.*

4 The most favourable observation on HILL 170 and EVERLEY is from N.W. From lie of ground EVERLEY can assist enemy defence of HILL 170 but not of HILL 160, e.g. m.g's south of CHURCH HILL PLANTATION flank approaches to HILL 170 from north—but the 160 spur shields for the most part from the EVERLEY direction our attack on HILL 160 from the north.

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Therefore (a) HILL *170 attack requires more artillery support than* HILL *160.*

Also (b) HILL 160 attack can co-operate with 3rd Division advance. It will be entirely out of view from the MILTON HILL direction and amounts almost to a separate operation. *Thus one battery will suffice to support the battalion attacking* HILL *160 and should be under that battalion's orders.*

5. For the attack on HILL 170 we require fire on (i) neighbourhood of CHURCH HILL PLANTATION, (ii) possibly LOWER EVERLEY, (iii) HILL 170 itself if held, (iv) LIDBURY CAMP area whence HILL 170 can be flanked by m.g. fire. (This is wide to the flank and may not be occupied.) Close support guns might be useful in LOWER EVERLEY but can be dispensed with if they are more required elsewhere. *Thus the 4·5 and two 18 pr. batteries required. Close support guns not allotted. Ammunition expenditure in this phase should not exceed 50 rds. per gun without my authority.*

(Note.—These artillery targets will remain unchanged if tanks are used by us or not. The only difference will be that the expenditure of ammunition on LOWER EVERLEY and HILL 170 will be less. The quick engagement of anti-tank guns as well as of the m.g's engaging the accompanying infantry is an added responsibility of the artillery. Such targets are more likely to be found flanking the tactical locality under attack than sited within it.)

HILL 170 is favourable ground for tank action and we must be prepared for a hostile tank attack against it after capture. *In the absence of close support guns the affiliated 18 pr. battery must be responsible for anti-tank defence.*

6. The occupation of HILLS 170 and 160 will allow flank attacks to be developed in concert with a direct attack on EVERLEY. Good supporting m.g. fire can be given from HILL 170, WEST EVERLEY DOWN, TUMULI SPUR (M 5352) and HILL 160. Artillery fire required:—

(a) In concert with m.g's on belt of woods CHURCH HILL PLANTATION to MARLBOROUGH ROAD COTTAGES. *1200 yds. of which 300 are very thin and 350 yards is the frontage of* CHURCH HILL PLANTATION. M.g's in direct enfilade of north edge of belt. *Thus 4·5 and two 18 pr. batteries should fire on the plantation and belt and on the south*

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edges of belt for about 10 minutes at average rate of 4 rds. per gun per minute, 40 rds. per gun.

(b) Rectory enclosure and belt of plantation along east edge of EVERLEY locality. *Require one battery each.*

(c) Close support within locality after penetration.

(d) *Engagement of enemy reinforcements arriving by such lines of approach as*

(i) Valley about M 3029.

(ii) Tracks on EVERLEY DOWN.

(iii) Valley bottom near LOWER HOUSE FARM.

Ammunition expenditure not more than 60 rds. per gun.

7. If a further advance beyond the line LIDBURY CAMP—GORE DOWN has to be undertaken, the first objective will probably be HILL 143.3 (M 10)—WEATHER HILL—HILL 145 (M 62). If on the other hand the line LIDBURY CAMP—GORE DOWN has to be consolidated, fire should be able to reach the WEATHER HILL line at least. WEATHER HILL *is 7000 yds. from* WINTER'S PENNING in which neighbourhood are favourable gun positions for supporting all attacks (except attack on HILL 160) up to and including that on EVERLEY. *Therefore at the latest on the capture of* EVERLEY *guns should move forward to say north of* GRANT'S FIRS *in M 15, or* ROUND DOWN *or* HILL *170. But this may be a critical moment with enemy's reinforcements arriving. Therefore some guns should move before attack on* EVERLEY *begins—preferably to near* GRANT'S FIRS *and as soon as attack is successful 4·5's might move to near* LOWER EVERLEY *where they may find themselves usefully placed later for blinding* SIDBURY CAMP.

The plan which has thus taken shape in Lt.-Col. Gunner's mind can be summarised as follows :—

(A) Bring one 18 pr. battery into action at once near WINTER'S PENNING to support cavalry in EVERLEY ASHES and help attack on AUGHTON DOWN if required.

(B) Transfer vanguard battery to the command of 3rd Bn., K.O.S.B., for attack on HILL 160.

(C) Support attack on WINDWARD BALL PLANTATION with two 18 pr. batteries and the 4·5″ battery, the battery in (B) co-operating

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by firing on interior of MARLBOROUGH ROAD PLANTATION. Ammn. 18 prs. 30 rds. per gun. 4·5″ 6 rds.

(D) Support attack on HILL 170 with two 18 pr. batteries (one affiliated to 4th Bn., S.W.B.) and the 4·5″ battery, paying particular attention to possible hostile flanking fire from EVERLEY. Ammn. not more than 50 rds. per gun.

(E) Support attack on EVERLEY with all batteries, battery in (B) still acting independently in support of any infantry operating east of EVERLEY locality: and moving one 18 pr. battery in to closer range.

(F) Concentrating pack battery after capture of WINDWARD BALL PLANTATION and placing under orders of 2nd. Bn., K.O.Y.L.I., for close support of attack on EVERLEY.

(G) As soon as our infantry penetrate EVERLEY locality, engage enemy reinforcements, moving 4·5″ battery by sections up to near LOWER EVERLEY.

The above plan is now laid by Lt.-Col. Gunner before the advanced guard commander who approves with one modification. He asks that no ammunition restriction should be laid on the guns for the attack on HILL 170, which he thinks so important that he is justified in exhausting all his resources to capture it.

When Lt.-Col. Gunner rode forward with the advanced guard commander, he ordered his battery commanders (including the pack battery commander), each accompanied by a horse-holder and an orderly, to rendezvous at the farm near M 3592.

Lt.-Col. Gunner completed his plan and had obtained the A.G. Commander's approval by 0935 hours. By this hour the Vanguard Commander has finished his reconnaissance and is issuing his orders to his company commanders behind the crest about M 4195. He expects the battalion to be ready to advance about 1000 hours. Lt.-Col. Gunner at once orders his 14th Battery commander to bring his battery into action between WINTER'S PENNING and MILTON HILL CLUMP with the object of protecting EVERLEY ASHES from attack from the S.W. and of helping the attack on AUGHTON DOWN if required. As soon as he has given the necessary orders he is to return to Brigade H.Q. to receive instructions regarding the main attacks that are to follow. He is warned that his zone of fire must cover HILL 170 to AUGHTON DOWN.

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A message is also sent to the 13th (Vanguard) Battery ordering its commander to report to Bde. H.Q. as soon as the vanguard has cleared the woods or sooner if convenient.

Thus by 0945 hours Lt.-Col. Gunner, who has called his remaining battery commanders up to MILTON HILL CLUMP, is ready to give his verbal orders. They are as follows :—

Information.

1. (a) It is reliably estimated that about two enemy cavalry regiments are in the woods north of EVERLEY (EVERLEY ASHES excluded) and as far north as AUGHTON DOWN. One infantry battn. has debussed in EVERLEY. Two or three batteries are now probably reaching neighbourhood of SIDBURY CAMP. Two heavy columns of all arms marching from the south may reach SIDBURY CAMP by 1200 hours.

(b) Our cavalry are in occupation of the following points (points out on ground) POND—WINTER'S PENNING—CHALK PITS—EVERLEY ASHES (where they are being reinforced)—Tumuli east of MILTON HILL FARM—Tumulus (M 58)—HILL BARN. They have been ordered to occupy CROWDOWN CLUMP.

The vanguard has orders to clear all woods north of MILKING BUSHES—INFIRMARY COPSE road and then relieve cavalry in EVERLEY ASHES. 14th Fd. Battery is now coming into action to support cavalry in EVERLEY ASHES and assist vanguard if required.

The intentions of the advanced guard are to attack and capture objectives in the following sequence :—

(i) Woods N. of MILKING BUSHES—INFIRMARY COPSE road.
(ii) WINDWARD BALL and MARLBOROUGH ROAD PLANTATIONS.
(iii) HILL 160 (in concert with advance of 3rd Division troops).
(iv) HILL 170.
(v) EVERLEY locality (i.e. triangle CHURCH HILL PLANTATION—MARLBOROUGH ROAD PLANTATION—UPPER EVERLEY).

After the capture of EVERLEY either the line LIDBURY CAMP—UPPER EVERLEY— GORE DOWN will be held or orders will be issued for a further advance.

Intention.

2. The artillery will co-operate in the following manner.

(Note.—Advance of vanguard against woods is now in progress.)

(a) One 18 pr. battery will act under orders of 3rd Bn., K.O.S.B.

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(b) Remainder of 4th Fd. Bde. R.A. will employ observed fire and timed programmes on

(i) WINDWARD BALL PLANTATION and MARLBOROUGH ROAD PLANTATION.

(ii) N. and W. edges of EVERLEY.

(iii) LOWER EVERLEY and HILL 170.

and (iv) Will engage enemy reinforcements arriving from the south, including his guns in action.

(c) 1st Pack Battery will closely support infantry attack on and through EVERLEY.

Method of Execution.

3. Take down the following details regarding your batteries :— (See tabular statement A.)

Opening of Fire.

4. No restrictions regarding opening of fire.

Ammunition.

5. Provisional A.R.P. Point X (about 1 mile beyond north edge of map.)

Medical.

6. Advanced Dressing Station Farm at M 3592. 4th F.A. Bde. Aid Post Tumulus M 3085.

Intercommunication.

7. 6th Inf. Bde. artery MILTON HILL CLUMP—DOWN FARM—LOWER EVERLEY.

4th F.A. Bde. Report Centre MILTON HILL CLUMP moving on capture of WINDWARD BALL PLANTATION to Tumuli M 2869.

Communication to Batteries visual and orderly until Tumuli occupied by Arty. Bde. H.Q., then cable.

Any Questions?

It will be seen in comparison with the attack problem published in the October number of the Journal that in advanced guards even greater forethought is required than in an attack for which time for preparation is available : that artillery has to be thrown into the fight piecemeal and economy of force is consequently an important principle to observe if the support given in later stages is not to be prejudiced : that wide dispersion is often imposed on the artillery and finally decentralisation of command must not be shirked when called for.

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Though greater forethought in its broad aspect is called for, the rapidity of an advanced guard action does not allow the artillery commander to evolve his plans in complete detail before issuing his orders. It will be observed in the above orders that no targets are allotted beyond the 2nd phase. For the attack on HILL 170 Lt.-Col. Gunner must seek out the C.O. of the 4th Bn., S.W.B., and hear his plan of attack and his wishes regarding support and must ascertain in particular what the action of the supporting m.g's is going to be. Time might be saved in a well trained brigade if the commander of the battery affiliated to the S.W.B. worked out an artillery plan for that phase of the action and submitted it to Lt.-Col. Gunner who might be studying in the meanwhile the problems connected with the final attack on the EVERLEY locality.

It is obvious moreover that the rapid appreciation of a tactical problem and the production of a far-seeing plan by an artillery commander require training of a high order. Constant practice is essential to ensure method and logic without which neither speed nor adequacy are attainable. Though the foundations of efficiency in these directions can be laid by the solution of problems on the map, the execution of such problems on the ground in concert with officers of other arms is essential.

The difficulties of squeezing more hours out of the crowded days at practice camps are great. But it must be admitted that the camps present invaluable opportunities for giving officers of all arms practice in carrying out reconnaissances and forming plans together of which perhaps full advantage is not always taken. If such a scheme as the one we have just considered were forming the basis of a brigade tactical day, it would be instructive to watch the reconnaissance being carried out by artillery and infantry officers on the day before and to time them in the production of their plans and the verbal issue of their orders. Under discussion some amendments or amplifications might prove desirable before the brigade executed the approved orders on the following day.

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A. Method of Execution.

Battery.	Location.	O.P.	Zone of Fire.	Zone of Observation.	Tasks.	Ammn.	Remarks.
13th	...	...	...	...	Placed under orders of 1st D.C.L.I. Will be responsible for anti-tank defence of HILL 160.	...	...
14th	Between WINTERS PENNING and MILTON HILL CLUMP.	No restrictions.	HILL 170 to AUGHTON DOWN.	WEST EVERLEY DOWN and ROUND DOWN.	Protect EVERLEY ASHES.	...	Further orders to follow. Will be affiliated later to 2nd K.O.Y.L.I.
15th	N. slopes of PEWSEY HILL. (clear of 14th Bty.)	No restrictions.	LIDBURY CAMP to MARLBOROUGH ROAD PLANTATION	HILL 170 to CHURCH HILL PLANTATION.	(1) M463558 to M478558 (2mins) (2) M424557 to M449558 (3mins) (3) As desired by 3rd Bn. K.O.S.B.	Sh. Sh.	Time of opening fire will be notified later. Affiliated to 3rd Bn. K.O.S.B. Battery will be ready to advance to near GRANT FIRS (M15) as soon as HILL 170 is taken. Will be responsible for anti-tank defence of HILL 170.
16th (4·5″)	PEWSEY DOWN.	No restrictions. 1st claim on Pt. 195.7 (M 2563)	LIDBURY CAMP to MARLBOROUGH ROAD PLANTATION	HILL 170 to WIREN COPSE.	(1) WIREN COPSE (3mins.) (2) CHURCH HILL PLANTATION and RECTORY ENCLOSURE. (3) COUNTER BATTERY.	H.E. H.E. & Smoke.	Time of opening fire will be notified later. Further details will be notified later. Battery will be ready to move by sections to near LOWER EVERLEY on capture of EVERLEY Locality.

1st Pack Battery. Detached Section will rejoin from Vanguard as soon as attack on WINDWARD BALL PLANTATION begins and Battery will come under orders of 2nd Bn., K.O.Y.L.I., for consolidation of WINDWARD BALL PLANTATION and for close support of attack on EVERLEY.

N.B. If 1st Pack Battery has 6 guns then one section would closely support K.O.S.B. on HILL 170 chiefly for anti-tank defence.

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IV. REARGUARD.

Opening Situation.

The 2nd British Division, retiring in a S.W. direction, has shaken off the pursuit of the enemy whose leading troops are reported by cavalry and aircraft to be about 9 miles N.E. of Collingbourne Kingston at 0900 hours. The route of the Division is Brunton—Collingbourne Ducis—Glebe Barn—Cross Tracks M 5219—Hill 143.3 in M 10. At 0950 hours the head of the 4th Inf. Bde. (Commander Col. Comdt. Foote), which is rear brigade of the main body, has reached Glebe Barn and the column has just halted for the hourly 10 minute halt, when the G.S.O. 1 rides up to Col. Foote who is at the head of his brigade and gives him the following orders:—

"The enemy were reported by cavalry and aircraft to be about 3 miles in rear of our rearguard at 0945 hours, marching steadily after us. Their cavalry seems to be very tired and lacks energy. Our aeroplanes and A.A. fire have countered the hostile air action very satisfactorily but of course it may be renewed. They have succeeded however in damaging seriously the bridge over the R. Avon about 6 miles west of this spot and there is a serious accumulation of transport on the east bank. The Engineers have nearly repaired it but it will take time to clear the transport and get the column on the march again. The Divisional commander wishes you to prevent the enemy from reaching the line Weather Hill—Sidbury Camp before 1600 hours. In addition to your brigade you are to have the following under your orders:—

Rearguard mounted troops (8th Hussars) who will come under your orders as soon as the present rearguard passes through your position.
5th Fd. Bde., R.A.
20th Pack Batty., R.A.
101stMedium (60 pr.) Batty., R.A.
16th Fd. Coy., R.E.
A Coy. R. Tank Corps (only 50% of tanks effective).
1 Sect. Armoured Cars.

All of these units except your own brigade are now receiving orders to draw off the road to the north and halt. Their C.O's

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are to rendezvous at HOUGOUMONT FARM. You should not use the tanks if you can help it.

After 1600 hours you will continue to act as rearguard until you have passed through the night outpost position which will be found by other troops and notified to you as soon as selected."

Col. Foote, having ordered his brigade to assemble in the valley ¼ mile west of HOUGOUMONT FARM, takes his Bde. M.G.O. and Bde. Sig. Offr., rides up to HAZLEBERRY PLANTATION and sends for the O.C. 5th Fd. Bde., R.A. (Lt.-Col. Gunn) and O.C. "A" Coy., R. Tank Corps (Major Tanks) to join him there.

On the arrival of Lt.-Col. Gunn (senior commander of the artillery allotted to the rearguard) and of Major Tanks, Col. Foote gives the assembled officers the information of the enemy and of their own troops he has just received. At this moment the column on the road below them can be seen falling in to continue the march or to assemble north of the road in accordance with their orders. Dust can be seen rising from east of the GRAFTON CLUMP (Sq.98) probably caused by the head of the present rearguard moving S.W. on GRAFTON DOWN. Col. Foote points out that the rear parties are probably about 6 miles away and that therefore about two hours are available before responsibility for the protection of the division will devolve upon him. It is now 1000 hours. He remarks that the first point for decision is the position from which they will first delay the enemy; should this be where they are standing; nearer the enemy; or towards WEATHER HILL? "The first desideratum," he says, turning towards Lt.-Col. Gunn, "is long range artillery fire to force early deployment. What ground will suit you best for observation?"

Lt.-Col. Gunn examines his map, glances round at SIDBURY CAMP and looks through his glasses towards the N.E.

"This haze," he remarks, "limits useful observation to about 5000 yards. In any case you would not see the road at GRAFTON DOWN at all from here nor will you from up the ridge at HILL 160. I should like to have my O.P's on that forward ridge west of COLLINGBOURNE KINGSTON (called FURTHER RIDGE). It is only about a mile further back—and you have the river in front of you—a good place to check the enemy."

Col. Foote. shakes his head. "We would have to go as far

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north as INHAM DOWN 2½ miles from where my infantry now are—adds 5 miles to the distance some of them will cover to-day. Moreover the enemy might come by the LYNDEN DOWN road in M 94 instead of GRAFTON DOWN, turn the position and cut us off. No—it must be either here or the WEATHER HILL LINE."

Lt.-Col. Gunn. "Then make it this line so that I can be sure of the observation from SIDBURY CAMP up to the last. But mind you the enemy has got covered approaches to within 2000 yards of here and unless you can give me air observation exactly at the right moment (which I don't suppose you can) I cannot possibly guarantee to delay the enemy at long range."

Col. Foote. "Can't you shoot by the map or predicted?"

Lt.-Col. Gunn. "Not without survey help and that would take four hours from the time they begin work. Have we no aeroplanes?"

Col. Foote. "Only one, and I take it that the medium battery should have that. It cannot be helped. I cannot go further back on our tracks than here. You must make the best of it. Now, Vickers (Bde. M.G.O.), it is your say next as to the actual line we pick. From where can you best delay the enemy at ranges from 2000 to 1000 yards and then clear out or alternatively hold him for another hour or so if need be?"

Vickers. "Well, of course I can slate that crest opposite from here all right though I shall be rather exposed. However I may be able to do it with indirect fire. But I cannot cover the BOURNE VALLEY or COLLINGBOURNE DUCIS and its exits. In fact I should be happier, I think, back in WEATHER HILL FIRS and tucked into some of those hollows on SNAIL DOWN."

Col. Foote. "Yes, we will make the most of the WEATHER HILL line in due course. But I am very anxious to check the enemy from here in the first instance. Gunn, I suppose you can bring the COLLINGBOURNE DUCIS and its exits under fire and the valley bottom further south?"

Lt.-Col. Gunn. "As far as I can see the steepest slope (at about M 8235) is 1/6.[1] 18 prs. could do that from about 4000 yds. range. The howitzers will do it comfortably. Yes, you can rely on us to cover the valley all right."

[1] It is easy and useful to remember that the slope of descent of an 18 pr. shell is about 1/8 at 3000 yds. and 1/4 at 4500 yds.

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Col. Foote. "Have a good look towards the rear, Vickers. I want you to make the most of all the ground between here and the WEATHER HILL LINE, covering successive retirements. You see we shall go from here first—our right flank is sure to be turned—onto COW DOWN and HILL 145 (Sq. 62), covered by GORE DOWN; then we will swing the GORE DOWN detachments back covered from HILL 145; and finally the COW DOWN and HILL 145 parties will slip away round and between SIDBURY CAMP and WEATHER HILL. Cavalry and armoured cars on the left flank. Now Tanks, what about you? I am not to use you if I can help it. If the enemy is rushing us badly in our withdrawal and especially if they attack with tanks, I shall have to. What do you suggest?"

Major Tanks. "It seems to me I had better hide up in EVERLEY. If I am not wanted I can slip away under cover. I am handy to support the cavalry if our left is getting shaky. If needed during the first two stages of the withdrawal you have just sketched, I can get out unexpectedly through LOWER HOUSE FARM, sweep down the valley and over the S.W. slopes of GORE DOWN and HAZELBERRY PLANTATION and the forward slopes of HILL 145, swing round HOUGOUMONT FARM and get away up SNAIL DOWN where I should soon get cover."

Col. Foote. "Good, I like that. Would you want the guns to help you?"

Major Tanks. "It is hard to say because one cannot foresee what the situation will be. They might shell the PLANTATION. It will probably be regarded as tank-proof and the enemy in the neighbourhood may flock into it. I won't go in for fear of being stumped. Then as we turn for home, smoke on the PLANTATION and on the ridge east of it might be useful."

Col. Foote. "Well gentlemen, there is my plan. "A" Battn. from Pt. 141.1 to HAZLEBERRY PLANTATION inclusive with HOUGOUMONT FARM as a strong point in case of need: "B" Battn. HILL 160 and GORE DOWN: "C" Battn. COW DOWN and SIDBURY CAMP: "D" Battn. HILL 145 and WEATHER HILL. "A" and "B" on withdrawal to go back to Hill 143.3 (Sq. 10) and COOMBE HILL. All M.G's brigaded. Cavalry and armoured cars on our left flank. Tanks concealed in EVERLEY. My Report Centre Tumulus M 4612. Advanced Report Centre WEST HILL connected by cable which will

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eventually be abandoned. Later, Report Centre will move to HILL 143.3 whence communication to "C" and "D" Battns. will be by visual and runner. Advanced Dressing Station HAXTON O (Sq. 30). Gunn and Vickers, I want to see your proposals as soon as you can show them to me. We have not much time to spare. Can you work out your plans in the rough from here?"

Vickers. "There is one thing I should like to know, Sir. If we have to fight hard for an hour or so, will it preferably be in this area or further back?"

Col. Foote. "If the initiative is with us, it will be in the area between COW DOWN and HILL 145 in front and SIDBURY—WEATHER HILL in rear. We must retain our artillery observation on those points as long as possible."

This conversation has been given in the above form partly in order to illustrate the principle that the defence (in which category rearguard action falls) is based first on artillery considerations of observation and concealment. Secondly, when the line on which the enemy is to be stopped has been decided after the artillery factors have been given due consideration, the actual siting of the line within that approximation is mainly based on machine gun requirements.

Major Vickers at once outlines his proposals as follows, based on the map and on what he can see from near the PLANTATION :—

Battn.	*No. of Guns.*	*Approx. Site.*	*General direction of belts of fire.* Grid Bearings.
"A"	2	7635	4° to 18° Indirect Fire.
	2	6837	5° alternative 338° Indirect Fire.
	2	6932	70° In reserve.
	2	7229	332° In reserve.
"B"	4	6143	87° alternative 50°
	2	5940	350°
	2	6138	88°
"C"	2	7118	30°
	2	6817	352°
	2	6109	59°
	2	5712	34° with an alternative position from which to fire on SOUTHLY BRIDGE.

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"D"	2	6125	73°
	2	5924	352°
	2	4926	38°
	2	4919	77°

Col. Foote agrees. Lt.-Col. Gunn having noted the m.g. plan on his map proceeds to his appreciation. This is given here in the same manner as in the Advanced Guard example, namely, points that have already occurred to Lt.-Col. Gunn are printed in ordinary type, while those of particular artillery significance and all deductions that now occur to him are printed in italics.

It is now 1030 hours.

Lt-Col. Gunn appreciates the problem before him as follows :—

My *Objects* are

(i) To delay the enemy and force him to deploy at as long a range as possible.

(ii) To protect the infantry in their successive positions from attack.

(iii) To assist the infantry in their successive withdrawals, including the withdrawal from HILL 143.3—COOMBE HILL.

The Enemy may approach either by the GRAFTON DOWN or by the LYNDEN DOWN road, the latter leading on SOUTHLY BRIDGE east of SIDBURY CAMP. Our right is the most exposed flank *and wants more watching by the guns than the left.* I get a fair view of the LYNDEN DOWN road from here but I should have to go forward towards INHAM DOWN above COLLINGBOURNE KINGSTON to see the GRAFTON DOWN road. Supposing one can see about 5000 yds. from there (apparently the range of visibility to-day) the enemy would come into view about 1200 hours. *I have time therefore to establish an O.P. escorted by cavalry on* INHAM DOWN *or on the ridge south of it (called* FORWARD RIDGE*) and register one or more batteries at long range on the* GRAFTON DOWN *road, telling the O.P. to stay as long as they are not in danger of being cut off.* The enemy's guns may cover their infantry deployment from the ridge FAIRMILE DOWN (Sq. 97)—NEW BUILDINGS (Sq. 87), 4500 yds. from HAZLEBERRY PLANTATION. They would be clearly visible from INHAM DOWN—*another reason for keeping that O.P. there as long as possible.* If the enemy is approaching by the LYNDEN DOWN road there are gun positions N. of MOUNT

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ORLEANS FARM (Sq. 93) 2500 yds. from HAZLEBERRY PLANTATION. *I must have one or two batteries well up to this ridge we are on to get long range.* The enemy's tanks are going to be delayed in crossing the river if the bridges are properly blown but no doubt they will get over eventually on either flank. Therefore tank attack is more probable in the later phases than the early ones. But in the later stages our own tanks will be ready to intervene if necessary. *The whole of anti-tank responsibility therefore does not fall on the gunners. One pack section in close support of each of "C" and "D" Battns. with the remainder of the battery under the infantry bde. commander's hand should meet the case. These sections should come under "A" and "B" Battns. after the evacuation of the* WEATHER HILL *line.*

Our *own troops* can cover their successive withdrawals well by machine guns with the following exceptions:—

(a) The valley from COLLINGBOURNE DUCIS to the bend at 8431 is not under M.G. fire.

(b) The valley immediately N.E. of the HAZLEBERRY PLANTATION—HILL 160 ridge.

(c) The hollow 500 yds. N. of HILL 145 (a likely place of assembly for an attack on 145).

Moreover m.g. fire cannot touch the valley between the two COLLINGBOURNES.

These are targets demanding our special attention. If our tanks are called on to make their sweeping attack they want masking fire as they swing round HOUGOUMONT FARM. This should be put down from HAZLEBERRY PLANTATION along the ridge to the east on a front of about 1000 yds. *This would take all four batteries. They must register as soon as our infantry withdraw from that ridge.*

As regards the *Ground* I have noted the value of observation from towards INHAM DOWN; the line of advance open to the enemy via LYNDEN DOWN; the gun and observation positions afforded by HAZLEBERRY PLANTATION ridge (called HAZLE RIDGE) and the SIDBURY CAMP—WEATHER HILL ridge. *Lines of retirement from the first, unseen to the enemy, are (a) via* SNAIL DOWN and *behind* WEATHER HILL FIRS, *and (b) up the valley N.W. of* HOUGOUMONT FARM and through LOWER EVERLEY, *thence S.E.*

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I need not hesitate therefore to leave guns on HAZLE RIDGE for *fear of not getting them away.*

EVERLEY DOWN *is a good gun position on the left protected by the cavalry and tanks. I must have one battery on* HAXTON DOWN *for co-operation with "C" Battn. Owing to the slopes of* SIDBURY HILL, *this should be the howitzer battery.*

Various *alternatives* present themsleves :—

(i) *Shall I push the 60 prs. well up in the first instance or leave them in one position?*

Latter is preferable if feasible. From HILL *143.3 it is 12,000 yds. to* GRAFTON DOWN *which is quite good enough. The head of the enemy column will be almost there by the time the battery is ready to shoot.*

(ii) *Should every battalion have close support guns?* The infantry brigadier does not mean to fight it out on the HAZLE RIDGE line. If we were rushed at all on that line pack guns might find it difficult to get away. Also a hostile tank attack is more likely on the rear zone. *I will give close support guns therefore to "C" and "D" Battns. and not to "A" and "B" until they reach the* HILL 143.3—COOMBE HILL *line.*

(iii) *Shall I put all four batteries well up on* HAZEL RIDGE *and then start moving them back alternately from there?*

If I do that all the value of the registration done from the INHAM DOWN *O.P's will be lost.* EVERLEY DOWN is 5000 yds. from COLLINGBOURNE KINGSTON and batteries on the DOWN or on HAXTON DOWN can be ranged on the valley between the two COLLINGBOURNES which will always be a important target. I want to be able to fire simultaneously on both lines of approach open to the enemy (i.e. the GRAFTON DOWN and LYNDEN DOWN roads.) *Therefore I will put two batteries up on* HAZLE RIDGE *and two back.* I want long range on the approaches and howitzer fire in the valley. *Therefore 18 prs. must be forward and the howitzer battery back.*

(iv) *Shall I affiliate any or all batteries to battalions?*

The leading battalions will provide little more than escorts to the machine guns. They are going to withdraw before the enemy come to close quarters. *They do not need affiliated batteries. "C" and "D" Battns. however and "A" and "B" in their final*

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position (HILL *143.3*—COOMBE HILL) *do need them.* To engage the hollows on the N.E. slopes of WEATHER HILL and SIDBURY CAMP behind our retiring infantry requires howitzer fire for preference. The batteries on this line will be too close up of course to support the retiring infantry to the last. But it is during the final slip away that the infantry want instant support most. *The task must therefore be taken over by the forward 18 pr. batteries after their withdrawal to* COOMBE HILL *when they will become affiliated to "C" and "D" Battns., helping their final withdrawal from the* WEATHER HILL *line while the howitzer and other 18 pr. battery will retire eventually past* COOMBE HILL *and come into action further west where they can cover the final withdrawal from* HILL *143.3*—COOMBE HILL.

(v) *How much cable shall I run out?*

My Report Centre will be near Col. Foote's at the Tumulus. To control the retirement of the forward batteries I can use the infantry wire. *I must have a cable to* EVERLEY DOWN *which is out of sight of the Tumulus;* can rely on visual to COOMBE HILL; and on visual from HILL 143.3 to EVERLEY DOWN or COOMBE HILL.

(vi) My Aid Post must move as little as possible. Forward batteries must use "A" or "B" Battns. if necessary. *Ours can be first by* OLD CHALK PIT *in Sq. 32 and later at* COOMBE FIELD BARN *(Sq. 01).*

(vii) *I must try and arrange with the Division to dump 76 rounds a gun (18 pr.) and proportionately for other natures about* MILE BALL *(Sq. 00).*

My *Plan* is accordingly as follows:—

A. To order 13th and 14th Batteries into action at once behind HAZLE RIDGE with O.P's on INHAM DOWN to bring long range fire onto the enemy's approaches.

B. To order 15th (18 pr.) and 16th (4·5″) Batteries into action at once on EVERLEY DOWN and HAXTON DOWN arranging temporary O.P's on FORWARD RIDGE to register point in the BOURNE VALLEY as soon as our present rearguard is clear.

C. To withdraw 13th and 14th Batteries to COOMBE HILL on the enemy coming under our machine gun fire, affiliating them to "C" and "D" Battns. respectively.

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D. To withdraw 15th and 16th Batteries not later than the capture by the enemy of the line BARROW PLANTATION—HILL 145, moving them to positions off the map from which they can cover the final withdrawal from both the WEATHER HILL and the COOMBE HILL lines, affiliating them to "A" and "B" Battns.

E. To support closely "C" and "D" Battns. with one Pack Section and to keep the battery less two sections near Inf. Bde. Hd. Qrs., transferring those sections later to "A" and "B" Battns.

F. To allot the aeroplane, if one arrives, to the medium battery, placed in action about Sq. 11 with O.P. on SIDBURY CAMP. Tasks long range delaying fire and counter-battery.

Lt.-Col. Gunn, having obtained Col. Foote's approval to this plan by 1050 hours calls up his battery commanders (including the pack and the medium) and issues his orders in the following manner:—

"I am naming the following points (points out on ground):—

GRAFTON DOWN road—LYNDEN DOWN road—FURTHER RIDGE—HAZEL RIDGE—HILL 145—HILL 143.3.

1. (a) The enemy is not pressing our rearguard heavily. He is expected to reach GRAFTON DOWN at about 1200 hours. It is now 1052 hours. Will you synchronize your watches.

(b) Our Divisional Transport is in difficulties and the 4th Inf. Bde. with certain attached troops is taking over the rôle of rearguard from the line we are on now with orders to prevent the enemy reaching the line SIDBURY HILL—WEATHER HILL before 1600 hours.

Each of you send an officer to my Report Centre as soon as you can to copy onto a map the details of infantry positions, machine guns and their lines of fire.[1]

The general intention is to delay the enemy by long range fire from this line and to delay him by fighting if necessary in the area between here and the line SIDBURY CAMP—WEATHER HILL. The cavalry and tanks will be in the EVERLEY area, tanks not being used if avoidable. If the enemy's pressure must be relieved, the tanks will make a sweep from EVERLEY round HOUGOUMONT FARM, returning via SNAIL DOWN covered by our fire on this ridge here.

[1] It would delay the B.C's too much to give them all this information now. But it is important they should have it accurately and in detail.

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2. My intention is to develop long range fire from this line; protective fire from EVERLEY DOWN and HAXTON DOWN; covering fire for the withdrawal from the WEATHER HILL line from about COOMBE HILL; and from a position still further west for the withdrawal from COOMBE HILL.

3. Jones and Robinson (13th and 14th B.C's) get your batteries into action along this ridge; 13th east of HAZLEBERRY PLANTATION and 14th west. Push O.P's right forward under protection of the cavalry onto INHAM DOWN or south of it, and register both possible lines of the enemy approach at as long ranges as you can as soon as our rear parties are clear; and then delay the enemy as long as you can. Use up to 100 rounds a gun if necessary but not more without reference to me. I will bring all further orders to you myself soon after you are in action. I will not give you zones; for both batteries must get onto favourable targets of any extent. I leave it to your discretion. Get your O.P's as close together as possible and work together.

4. Jot down the following before you go :—

An ammunition dump of 76 rounds per 18 pr. and 48 per 4·5″ will probably be at MILE BALL.

5. While in this forward position use the battalion's regimental aid posts. Ours will be first about 3423 and later COOMBE FIELD BARN. A.D.S. is at HAXTON O.

6. My Report Centre will be Tumulus (4612) and later HILL 143.3. Intercommunication—Tumulus to here by Inf. Bde. cable : to EVERLEY DOWN our own cable : Tumulus to COOMBE HILL and HILL 143.3 to COOMBE HILL by visual and orderly.

Any Questions?"

Jones and Robinson having departed at about 1100 hours, Lt.-Col. Gunn continues his orders to the remaining batteries.

"Smith (15th B.C.) and Peters (16th B.C.) take up covered positions on EVERLEY DOWN and HAXTON DOWN respectively. Get temporary O.P's right forward onto FORWARD RIDGE to register you onto points in the BOURNE VALLEY between COLLINGBOURNE KINGSTON AND COLLINGBOURNE DUCIS. Take special precautions to assure yourselves that the last of our rear parties have passed

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before you start registering. Your main O.P's must be near your batteries. Peters (16th Bty.) your zone of fire will be HILL 155 (8921) to GORE DOWN. Zone of observation KNOLL PLANTATION (Sq. 93) to HAZLEBERRY PLANTATION. Tasks (i) to delay the enemy as soon as they come within your range, (ii) to engage any hostile guns you locate, (iii) to cover the retirement of 13th and 14th Batteries, (iv) to protect "C" and "D" Battns. in their positions and to cover the first stages of their retirement. You will be affiliated to "C" Battn. You will answer any LL call from the air within your range. I will send you the Bde. Wireless set.

Smith your fire zone is HOUGOUMONT FARM to HILL 160. Zone of observation HAZLEBERRY PLANTATION exclusive to HILL 160. Your tasks are the same as Peters'. You are affiliated to "D" Battn. Dividing line between you for counter-battery work west end of HAZLEBERRY PLANTATION to TINKERS BARN (9464). If you can possibly manage it you should be able to shoot down to 1500 yds. with reduced charges.

As "A" and "B" Battns. withdraw, you Peters send an officer back with "A" Battn. and you Smith send one back with "B" Battn. to see the position they take up and to reconnoitre positions for your batteries to retire to, on orders from me, from which to cover the eventual withdrawal of those battalions. Preferably, if the ground allows, you should be in action about 3000 yds., but not less, from the rear of their area.

Pack Battery, will you please send a section for close support of each of "C" and "D" battns. We will transfer these sections later to "A" and "B" Battns. Will you with your third section remain for the present near the Tumulus.

Medium Battery, please find a position somewhere in Sq. 11 and undertake long range delaying fire and counter-battery work. You can put an O.P. on SIDBURY CAMP. Please be very sure our rear parties have passed before you open fire.

Is that all clear?"

As soon as opportunity allows, Lt.-Col. Gunn seeks out Jones and Robinson, sees what progress they are making with registrations, assures himself that their arrangements for insuring that rear parties are clear are adequate, and gives them the following additional orders :—

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"As soon as your forward O.P's have to come in send back an officer each to reconnoitre positions about COOMBE HILL from which to help to protect the SIDBURY CAMP—WEATHER HILL line and to cover the eventual withdrawal from it. Jones, your zone of fire must cover from SIDBURY CAMP to WEATHER HILL FIRS: your zone of observation SIDBURY CAMP to WEATHER HILL and from SOUTHLY BRIDGE to HILL 145 exclusive. You must have forward O.P's on the WEATHER HILL line as long as possible.

Robinson, your zone of fire must cover WEATHER HILL to UPPER EVERLEY: zone of observation WEATHER HILL to EVERLEY DOWN and from HILL 145 to LOWER HOUSE FARM.

I will give you both orders to retire when the time comes. It will not be until the infantry are well clear of the WEATHER HILL line. You will relieve the 15th and 16th Batteries as affiliated Batteries to "D" and "C" Battns. respectively, and will co-operate with those batteries and continue executing the tasks they are performing.

I will give you the details of the tank protective fire I want you to put down in the event of our tanks making their attack and of certain other joint targets as soon as I have worked them out."

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ROYAL AIR FORCE AND ARMY CO-OPERATION.

By Major R. G. Cherry, M.C., R.A.

EVER since the R.A.F. broke away from the Army and Navy in 1918, there has existed the grave doubt whether the break-away would benefit either of the older services. Progress since the war has not tended to diminish this doubt, and as the new service found its feet and developed its own traditions, its own system of training and its own outlook on national affairs, the tendency has been to make this break-away more complete. In the last war there is no doubt that service in the corps squadrons which were employed mainly on artillery co-operation was unpopular compared with service in fighting and bombing squadrons, or in the independent air force. The reason for this is not far to seek. There was more honour and glory to be obtained in the fighting units, and naturally the best types of machine were allotted to them.[1] This had the result of attracting some of the best pilots and observers away from the co-operation squadrons somewhat to the detriment of the artillery and indeed to all arms of the service, as the artillery squadrons were responsible for close reconnaissance, photography and artillery co-operation for the corps on whose front they worked.

Another factor which is not so generally known is that many of the artillery officers, who had volunteered early in the war to

[1] Note: *cp.* "L'artillerie: ce qu'elle a été: ce qu'elle est: ce qu'elle doit être." Gen. Herr. *pp. 258, 259.*—Artillery air observation. (Translated).

Born of the war air observation was at its best on the Somme in 1916, it deteriorated in 1917, and was practically useless in 1918. The reasons for this were, firstly constant changes of flights resulting in observers being unknown to battery commanders, secondly the lessening efficiency of artillery observers due to the fact that the best were attracted to the fighting squadrons, and finally indifferent aeroplanes.

Remedy.—Artillery observation service must be directly under artillery commanders. This was so in the German army during the war and the artillery was never neglected in this respect. The soundness of this was recognised in France—but flights did not accompany artillery regiments when they moved.

Artillery should produce and train their own observers, and keep them by looking after their professional advancement. The air service would be responsible for the pilots and the aeroplanes and their administration; but for artillery flights, its rôle should be merely to tell off aeroplanes as aerial observation posts, or as quick means of getting about, just as the automobile service tells off a motor to a staff officer who wants one for a reconnaissance.

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transfer to the Flying Corps in order to assist the artillery from the air, instead of being posted to command and man co-operation squadrons were taken for other duties, and in this way their experience of artillery was lost to the army.

Now if this was the case in the last war, when the Flying Corps was, until 1918, an integral part of the army, what may be expected in the future now that the Royal Air Force is a thing apart? The failure to regard the aeroplane as a vehicle from which to assist the army will be accentuated. It is true that co-operation courses are held at certain centres, but at the present time the Air Force high command is more concerned with the idea that air power will be the predominant factor in the next war.

Out of seventeen stations in the inland area of the Royal Air Force at home, all but two—Salisbury Plain and Farnborough—are completely out of touch with army units, particularly with the artillery. We of the army would like to see a proportion of air force commanders and pilots made to specialise entirely on army work, living alongside artillery and infantry units and thus establishing that intimate personal liaison which is of so much greater practical value than short intensive courses of instruction. There are at Aldershot and on Salisbury Plain a few air force units—three or four squadrons out of a total of about 30, definitely allotted to army co-operation and working in close touch with army units; but the pilots of these squadrons are not permanently earmarked for this work but spend three or four years, or even less, in these squadrons before being moved on to other air duties. There is a danger that the best pilots and observers will be taken, from among those trained in army co-operation work, when an emergency arises, such as the sudden outbreak of a great war against an enemy within air range of our coasts.

Let us look at this question of aeroplane co-operation with the army from the point of view firstly of the army and secondly of the gunner. In the early stages of a campaign, before close contact with the enemy is established, the military commander must depend largely on the air force for the necessary information on which to base his plans. Such information will, of course, be supplemented by, and compared with, information supplied by spies, strategic patrols, etc. One hopes that the temptation will be

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resisted to replace the casualties in fighting and bombing squadrons, that will undoubtedly occur in the initial phases of the independent air campaign, from the personnel of corps squadrons. If not, the military commander will have to rely on the reports of observers, many of whom will have but little air experience and will not realise the value of what they are asked to look out for. No general can base his plan on the unverified reports of inexpert observers.

Owing to the importance of the work, and the difficulty of training air force observers in peace, the army commander would prefer to send up staff officers, who know the strategical position and who at the same time have been trained to carry out observations from the air. Again, when touch has been obtained, he will want to have an accurate description of the movements in rear of the enemy's battle front. Here again it is the staff officer, who has been trained to direct the movements of our own back services, who will be of far greater use than the air force observer, who may not understand the significance of such movements as he may observe.

Now, from the artillery point of view, we work on a stereotyped procedure but little advanced since the end of the last war, whereby the pilot of the "artillery" machine finds and reports targets, observes and reports the fall of shell, while his observer is purely and simply an aerial gunner whose only role is to protect the pilot. The pilot has no control over the artillery fire. This system has, with practice, attained considerable success, but we have reached a point when no further advance seems possible. The artillery has deliberately given up one of its eyes to another service, that is to say trusts for the observation of their fire from the air to those who have at best no practical knowledge of artillery, except what has been gained by short attachments or co-operation at practice camps; and when the exigencies of a campaign have carried off the few trained pilots, then the artillery will have to rely on pilots who have only a smattering of knowledge and who barely know the stereotyped procedure.

Therefore the system has to be made foolproof and there can be practically no progress in developing observation. Now that radio-telephony provides a medium for controlling artillery fire from the air we wish to develop observation and control. But no

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gunner will give over this great power of concentrating and controlling fire to a pilot of another service, who has had no training in the use of concentrated fire, the control of ammunition expenditure, and the hundred and one problems that arise in connection with the observed control of artillery fire. Therefore it follows that gunners must take the air to control the fire of the guns.

The question has been debated of whether three-seater aeroplanes should not be used for observation for the army in general, and artillery in particular. The disadvantages of the employment of three-seater machines with two observers have been ably set forth in a pamphlet by the Air Ministry, and the writer is on the whole in agreement with them as far as they refer to artillery observation. It is unquestionable that the most suitable person to observe this fire is the pilot, who can always place his machine at any moment in such a position that he has the best view possible. A distinguished officer, speaking of army officers being trained as observers has stated that "the question of artillery observation will not be satisfactory until we have a large proportion of artillery officers trained to take the air (as observers) to be accustomed to move about freely in the air and observe and command from the air if necessary." If we substitute "pilots" for "observers," we are entirely in agreement with him.

Let us now consider the question of the air requirements of the army in a small war. In such a war, one may assume that the enemy will either have no air force at all, or at the most a small number of machines which will probably be badly equipped and handled. The necessity for good reconnaissance by officers who know the theatre of war is of enormous importance. Will any air force officer deny that reconnaissance from comparatively low altitudes can be best carried out by officers who have spent many years of their service in or near the locality? Especially is this true in the outposts of empire, where an intimate knowledge of the terrain and of the methods of the enemy is of paramount importance in reconnaissance on the ground or from the air. In such a campaign, the advantage of having fire controlled by an expert artillery officer is obvious. Targets, especially in bush and mountain warfare, will usually be fleeting opportunities, of which the fullest advantage can only be taken by rapid fire guided and controlled by radio-telephony.

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What is the best solution of this problem, so vital to the efficiency of the army? If it is impracticable and undesirable that the air force should return to its parent services, then the alternative is for the air force to specialise seriously. It must realise that a proportion of its cadre must be devoted heart and soul to the army, regarding its machines as vehicles for the collection and dissemination of army intelligence.

We are, as an army, intensely conservative, and army circles encouraged by the air force, are now under the influence of the aeroplane fetish. We are taught to regard the airman as a kind of superman, we are told a great deal about air sense and the difficulties not only of flying an aeroplane but even of going up in the air. We are told horrible stories of officers who were taken up into the air, saw nothing and were violently ill, thereafter becoming converts to the theory that army officers cannot carry out observations. In the late war, however, the writer, who is a very bad sailor, was sent on a reconnaissance after less than two hours' flying, and never as observer or pilot suffered from air sickness.

The young army officer (and he should for physical and psychological reasons be under 40) can be taught to observe as easily as an air force cadet, and his observations will have the greater value as he will have knowledge of troop formations and movements.

The taking and reading of aerial photographs can be quickly and easily taught. The routine of artillery observation can be taught on a miniature range on the floor of a shed with the observer perched on a ladder in the roof. A few hours' practical experience in the air will suffice to make any intelligent gunner officer into a good observer. The actual art of flying an aeroplane can be taught in a few weeks to nearly any young, fit and active soldier. The army could furnish to-day at least ten squadrons of pilots and observers with war experience, who would be fit, after refresher courses in air force units to command and man any co-operation squadrons.

This leads up to the last alternative, the assumption by the army of certain of the flying duties now carried out by the air force. In dealing with this question, it is not so much the provision of staff and other army officer observers for reconnaissance that needs careful consideration, as the problem of how we propose to employ

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the means of control of artillery fire offered from the air. It is necessary first to discriminate between tactical control and fire control.

Consider the tactical control of light artillery directly supporting an infantry attack, which includes of course control of ammunition expenditure per target. To wield this control efficiently the pilot observer must have consulted with the infantry commanders; he must have an accurate knowledge of the ground situation from time to time, and he must have indicated to him from the ground what important targets are to be engaged. In order to carry out these duties, he must fly over our advanced troops, that is to say within range of hostile machine guns. His height must, therefore, be not less than 3000 feet. From this height he certainly will not be able to distinguish hostile machine gun nests, which will undoubtedly form one of the most urgent targets; he will not be able to distinguish accurately our own infantry advance, or signals made to him from the ground.

We may, therefore, concede that in this, the most important case, tactical control from the air is impracticable. The further deduction from the above is that observers of light artillery will seldom be able to pick up fresh targets within, say, 2000 yards of the front line; and if they do, they cannot know whether it is tactically desirable to open fire upon them. Fire control from the air of certain targets is another matter altogether. Such targets as hostile reserves, transport, guns and headquarters will be distinguishable from 3000 feet. These are counter-battery targets and it is the normal role of the medium and heavy artillery to engage them. The best person to carry out fire control of such targets is the medium or heavy battery commander or a gunner officer of his status. Fire control of pre-arranged targets, i.e. time programmes, could also be carried out from the air by pilot-observers of light artillery. This can be carried out by assistant observing officers, that is to say the battery commanders need not take the air.

The next point to consider is how many machines would be required for use per division, to allow for adequate fire control from the air in war. It may be assumed that each division would have three light artillery brigades reinforced by one army brigade, and supported by one medium brigade and a heavy battery.

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Allotting balloon observation to the heavy or one of the medium batteries, we should require one machine in the air per medium battery—a total of four machines, and for the field brigades one machine for each of the two brigades that will probably remain under C.R.A's control. This gives a total of six machines continually in the air, to supply which two eight-machine flights would be necessary. That is to say one squadron would be required per division; this is an increase on present organisation, which allows one squadron per corps. To effect this, the first step in peace will be to provide gunner pilot-observers for medium or heavy artillery, and the second step to add pilot-observers for a proportion of the field artillery.

The nature and rate of progress will depend on technical developments. We assume that the practical use of radio-telephony for communication between air and ground is imminent, and that the artillery machine of the near future will not require an extensive landing ground in which to land. That is to say that in normal country an aerodrome or advanced landing ground can be found within reach by horse or car of the medium artillery and the rear brigades of the light artillery.

There are now three alternatives for effecting this change of organisation under which staff or other army officers will be utilised for close reconnaissance, and artillery fire will be controlled by gunners from the air.

(a) An army air service, manned chiefly by gunners, entirely independent of the air force. This would be accompanied by obvious difficulties of expense, recruitment, expansion, provision of material and administration.

(b) An army branch of the R.A.F.

This is equivalent to manning existing army co-operation squadrons with army pilots—chiefly gunners. That is to say the strengths of the Royal Artillery and the R.A.F. would remain unchanged, except that a certain number of R.A.F. pilots and observers would be replaced by an equivalent number of picked gunner and army pilots and observers. There would be no financial increase, but the internal administration of such squadrons would be difficult owing to there being personnel of two services in the same unit, subject to different regulations, wearing different

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uniforms, and having different traditions. It would be necessary either to attach the army pilots to the air force, or to attach the R.A.F. ground personnel to the army. Further, the control of fire would not be in the hands of the officers of the battery concerned.

(c) The reorganisation of army co-operation squadrons so as to affiliate these squadrons to the artillery of the divisions and corps for which the squadrons are earmarked. The gunners would have a proportion of their officers trained as pilots, while a number of staff and other army officers were trained as observers for reconnaissance. In each medium or heavy battery, the major or captain and two subalterns, and in each field brigade four captains or subalterns should be so trained on the type of machine with which these squadrons are equipped. These officers would go up as required to control the fire of their batteries under orders of the artillery brigade or group commander. The organisation of these squadrons would be modified to admit of N.C.O. pilots being allotted to two flights of each squadron, which pilots would be responsible for test flights and for the moves of their machines from one locality to another.

Of the suggested solutions to this problem which so vitally affect the future progress of air co-operation, the writer prefers (c), considering (b) as a practical alternative. Such development would depend on the loyal support of the R.A.F. and of the artillery. In the latter there are to-day a considerable number of officers who flew in the Great War. If only half of these would co-operate for a start, undergo refresher courses, and were then posted to units at Aldershot or Salisbury Plain, a beginning could be made. Even if the experiment failed, a number of officers would have been trained in modern air work and would be most suitable to be earmarked for liaison duties with the R.A.F. in the next war.

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THE BOMBAY HORSE ARTILLERY IN PERSIA, AND THE MUTINY, 1857-59.

With a photograph of the survivors of the Officers of the Fourth Troop taken in 1911.

By Major-General J. C. Dalton, Colonel Commandant, R.A.

BY the recent death of Maj.-Genl. W. Denis-de Vitré, most probably the last survivor of the old 4th Troop—reformed on 1st March, 1924, as "Z" Field Battery, R.A.—of whom an "Appreciation" appeared in the R.A. Regimental News of October, 1925, an opportunity is afforded to place on record a photograph, unique to most of us, of a reunion in 1911 of the four surviving officers of the Troop who served together in Persia and India.

I propose to give, (I) a very brief outline of the Bombay Artillery and of its four Horse Artillery Troops and their vicissitudes in nomenclature at, and since, the amalgamation of the Royal and Indian Artilleries in 1862, and (II) the services of the four officers concerned.

I intend to deal with the four troops *seriatim*, being chiefly indebted to Col. Spring's "List of Officers, Bombay Artillery" (Clowes, 1902), for the details, and to Lt.-Col. J. H. Leslie for bringing the changes in designation since 1902, up to date.

As will be seen, all the Troops have fine records which it is satisfactory to know are inherited and further enhanced by their present-day representatives.

As Col. Spring has dealt so ably with the early days of the Bombay Artillery, I need do no more than give a few important particulars concerning it.

I.

The Bombay Artillery was formed out of various special units, "guns crews," etc., belonging to the old Bombay European Regiment (later, the 2nd Battalion Royal Dublin Fusiliers) by a set of eighteen elaborate regulations, issued in London on 17th June, 1748.

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These decreed that all the various bodies which had hitherto carried on artillery work in the Presidency were to be merged into one "Company of Artillery," officered by a Second-Captain, one Captain-Lieut. and Director of the Laboratory, one First Lt.-Fire-worker, one second ditto., one Ensign and 110 rank and file.

One Hugh Cameron, promoted from master gunner, was appointed to be "First-Captain and Engineer of this No. 1 Company." [1]

The Bombay Artillery now grew steadily, and, in 1862, the various companies were incorporated into the Royal Regiment of Artillery and bear their modern titles as such.

It took part with distinction in most of the important war-like undertakings in SIND, AFGHANISTAN, Bombay Presidency, etc., being occasionally detached to Bengal and Madras on field service.

Though dating from 1749, it was only in 1759 that the officers of the Bombay Artillery were formed into a distinct corps, having prior to that date been on a general "Bombay Army" list.

In 1759 Bombay Artillery officers took part with Capt. R. Maitland's (R.A. 74) Company R.A. in the capture of SURAT on 3rd March, and their distinguished services in various parts of India are matters of history. It was not till 1811 that Horse Artillery was formed, on the model of the British Horse Artillery.

THE FIRST TROOP BOMBAY H.A.
Formed at SIRUR, December, 1811.

Services:

MAHRATTA WAR ... ... 1814-18.

ARABIA, Beniboo Ali ... ... 1820-21.
Authorized to wear "Beniboo Ali" on appointments.

SIND AND AFGHANISTAN ... ... 1840-43.
Three years and a quarter, marching and fighting—marched 3552 miles. At battle of Hyderabad, 24.5.1843, the Troop captured an "Eagle" and by G.G.O. 11th April, 1843, it was ordered to be called "1st or Leslie's Troop" and to bear the "Eagle" and "Hyderabad" on appointments "for ever".

MUTINY, Central India ... ... 1857-58.
Some fighting and capture of Tantia Topi on 20th June, 1858: specially thanked by Sir Hugh Rose.

In 1862 the troop became A/4 R.H.A.
,, 1864 ,, ,, ,, A/B ,,
,, 1871 ,, ,, ,, C/D ,,
,, 1877 ,, ,, ,, H/B ,,
,, 1890 ,, ,, ,, "N" ,,

[1] In 1902 this Company was represented by No. 86 Coy., R.G.A., and is now known as the 2nd Medium Battery, R.A.

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SECOND TROOP BOMBAY H.A.

Formed at SIRUR, 1st January, 1820.

Services:

SIEGE AND CAPTURE OF KITTUR ... ... Dec. 1824.

MUTINY, Rajputana, etc. ... ... 1857-59.

In 1862 the Troop was designated B/4 R.H.A.
,, 1864 ,, ,, ,, ,, B/E ,,
,, 1871 ,, ,, ,, ,, E/D ,,
,, 1877 ,, ,, ,, ,, K/B ,,
,, 1881 ,, ,, ,, broken up.
,, 1900 "Y" Battery, R.H.A. raised.
,, 1901 By A.O. 112, "Y" took over the records and honours of the 2nd Troop, Bombay H.A.
,, 1920 Absorbed by "A" Battery, R.H.A.
,, 1924 Reformed as "Y" R.H.A., on 1.3.24.
,, ,, Converted into "Y" R.F.A., on same date and absorbing 101st Battery, R.F.A.
,, ,, Became "Y" Field Battery, R.A.

N.B.—The Army Orders regarding the last three changes are Nos. 52 and 164 of 1924.

THIRD TROOP BOMBAY H.A.

Formed at Poona, 1st March, 1824.

Services:

SIND AND AFGHANISTAN ... ... 1838-40.
Marched to Quetta, Kandahar and Kabul; back to Karachi—2194 miles—Engagements at Ghazni and Kelat.

PUNJAB, Siege and capture of Multan and battle of Gujerat 1848-49.

PERSIA: Reshire, Bushire, Kushab and Mohamera ... 1856-57.

MUTINY, Central India ... ... 1857-59.
Much fighting and marching 2626 miles, (see "Spring").

In 1862 became C/4 R.H.A. In 1575 became D/C R.H.A.
,, 1864 ,, C/E ,, ,, 1882 ,, K/B ,,
,, 1871 ,, G/C ,, ,, 1889 ,, "Q" ,,
,, 1873 ,, G/D ,,

SOUTH AFRICAN WAR ... ... 1899-1901.
Fine Record (See Official History).

GREAT WAR ... (See Official History). ... ... 1914-18.

In 1920 became 148th Battery, R.F.A.
,, 1922 ,, 108th ,, ,,
,, 1924 ,, "Q" ,, ,,
,, ,, ,, "Q" Field Battery, R.A.

See printed "Records of "D" Battery, C Bde., R.H.A."; by Lt.-Col. Holberton, R.H.A. (Cattermole, 1878).

FOURTH TROOP BOMBAY H.A.

Formed at Poona, 1st March, 1824.

Services:

SIND AND AFGHANISTAN ... ... 1838-40.
Troop in the field for close on 3 years, marched 4100 miles. Fought at Ghazni, Kabul.

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PERSIA ... ... 1856-57.

MUTINY, Kolapur and Ahmadnagar Flying column ... 1858.
Marched 1300 miles (Captain D. Gaye).

EGYPT. Kassassin and Tel-el-Kebir ... ... 1882.
As N/A, R.H.A.

In 1862 became D/4 R.H.A.
,, 1864 ,, D/E ,,
,, 1871 ,, H/C ,,
,, 1872 ,, H/D ,,
Reduced February, 1884.
,, 1900 "Z" Battery, R.H.A. formed.
,, 1901 By A.O. 112 this battery reformed as from 4th Troop, Bombay H.A., and to carry on its records and honours.
,, 1913 Reduced.
,, 1914 Reformed.
,, 1920 Absorbed by "B" R.H.A.
,, 1924 Reformed as "Z" R.H.A., 1.3.24, and converted into "Z" R.F.A., same date.
,, ,, Became "Z" Field Battery, R.A.

In 1875 became E/E R.H.A
,, 1877 ,, E/C ,,
,, 1882 ,, N/A ,,

N.B.—For last three changes see Army Orders 52 and 64 of 1924.

See also printed "Records of 'E' Batty., E Bde., R.H.A."; by Major Holberton, R.H.A. (Cattermole, 1876).

II.

SERVICES OF THE OFFICERS SHOWN IN THE PHOTOGRAPH.

362. DOUGLAS GAYE. b. 9.1.1825. 2nd Lieut. Bombay Artillery, 11.12.41. Lieut. '45, Capt. '54. Lieut.-Col. '61. Bt. Col. '66. Col. '69. Served in SIND, 1843, in command of two guns at night attack on British Camp at SHAHDADPUR when forces of Mir Shah Mahomed were defeated and all his guns taken, 16th June, 1843. Adjt. Arty. So. Divn. 1849-52. Was with 4th Troop, H.A., in Central India in later stages of MUTINY. Inspr. General of Arty. in India, Aug. 73 to Sept. 78. Retired 1878 with rank of Hon. M.G. Died at Umberleigh, S. Devon, Nov. 1911.

425. WILLIAM DENIS-DE VITRE. b. 18.3.1831. 2nd Lieut. Bombay Arty. 11.12.49. For Services see "Appreciation" in R.A. Regtl. News, Oct. 1925.

426. GODFREY TWISS. b. 20.2.1832. Addiscombe 1848-49. 2nd Lieut. Bombay Arty. 11.12.49. Lieut. '54. 2nd Capt. '59. 1st Capt. '65. Bt. Maj. '68. Maj. '72. Served in PERSIAN WAR 1856-57, Medal and Clasp; MUTINY 1858-59, B.M. of Cavalry under Sir H. Rose, in pursuit of Tantia Topi (medal). Adjt. 1st Battn. 1859, afterwards of 18th Brigade, R.A., to Nov. '61. ABYSSINIA, fall of Magdala 1867-68, *Desp.* 16th and 30th June, 1868, and Medal. Retired from R.H.A. as Hon. Lieut.-Col. 1.8.72. Later, was Lieut.-Col. Commanding Hants. Artillery Volunteers 1881-2, and Col. Commanding 2nd Hants. V.A. 1882-89. Died Southsea, 13th Sept., 1916.

441. THOMAS NELSON HOLBERTON. b. 21.2.1833. Addiscombe 1850-52. 2nd Lieut. Bombay Artillery 12.6.52. Lieut. '58. 2nd Capt. '60. 1st Capt. '66. Major '72. Lieut.-Col. '77. Col. '81. Col. R.A. '83. PERSIAN WAR 1856-57, Medal and Clasp. MUTINY 1857-58, Capture of Kolapur, pursuit of Tantia Topi, Medal. B.M. R.A. 1863-68. A.A.G., R.A. Bombay, 1879-84. Col. on the Staff C.R.A. Poona Div. and Kirkee, 1884-88. Retired 1.4.89. Died Walton on Thames, 21st Jan., 1915.

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Of the Officers in the photograph :

Major-General D. Gaye was

Lieut. 1st Troop	1844-45.	Lieut.-Col. E Brigade	1862-66.
,, 2nd ,,		Col. E and F ,,	1869-72.
Capt. 4th ,, ...	1859-61.		

Major-General W. Denis-de Vitré

Lieut. 1st Troop ...	1853-55.	Adjt. 4th Brigade ...	1863-64.
,, 3rd ,, ...	1855-57.	Command D/E ...	1867-74.
,. 4th ,, ...	1857.58.	Col. B. Brigade ...	1880-85.
Capt. B/4 R.H.A. ...	1861-63.		

Lieut.-Colonel G. Twiss

Lieut. 4th Troop ...	1854-59.	Major E/D	1871-72.

Colonel T. N. Holberton

Lieut. 3rd Troop ...	1856-57.	Major E/E	1874-77.
,, 4th ,, ...	1857-60.	Col. B. Brigade ...	1878-79.
Capt. D/4 ,, ...	1862-63.		

N.B. Col. Holberton's two pamphlets above quoted are well worth perusing and give a faithful and deeply interesting account, collected from the best sources, of the first Afghan war and the part played in it by the Bombay H.A. Also a good account of the Persian Campaign, wreck of *Julia*, early days of the Mutiny with extracts from Capt. Cotgrave's diary (4th troop) &c.

J.C.D.

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THE STORY OF THE SIKHS AND THE RECENT TROUBLES.

By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O.

I. THE PAST.

The Genesis of the Sikh Religion.
Races and classes in the Punjab.
The rise and fall of the Sikh Power.
The Sikh as a soldier.

II. MODERN TIMES AND PRESENT TROUBLES.

The Punjab under the British.
The Great War and after.
The recent troubles.

I. THE PAST.

The Genesis of the Sikh Religion.

FOR the last few years, both those who know India and those who do not, have been puzzled by the bitter hostility to government shown by many of the Sikhs and at the obscure occurrences that have filled the jails of the Punjab. That trouble has happily for the moment quieted down, during the last few months, but prior to that had at times been most acute. Apart, however, from a separate really revolutionary movement that certain Sikhs evicted from Canada had been carrying on, and an analogous movement by certain Bhabbar (or Lion) Akalis, the principal trouble has been a religious dispute between the two great divisions in Sikhism. But like all disputes in the present day, perhaps ever since we have ruled India, the internal dispute tended to become an anti-governmental movement. The quarrel within the Sikh community became a quarrel with government whose only desire was to help the Sikhs to agree over their own affairs. The advent of the new Governor, Sir Malcolm Hailey, and certain new measures, as well as the efforts of Sir William Birdwood (to be described later), have all combined to bring about a better state of affairs, and the Sikhs themselves have at last done what govern-

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ment for the last three years has urged them to do, namely introduced into the legislature a bill that will enable them to control their own religious affairs to their own satisfaction.

The Sikh is so important an item in the forces of the Empire, and his martial figure and reputation are so well known, that it is desirable that the whole Sikh story should be understood, especially as it is one concerning which many misconceptions prevail. It is especially desirable that we should understand what "Sikh" stands for, and what it means, for in this lies the root of the trouble. The word itself means nothing more nor less than "a disciple," from the root of which *sikhna* is the infinitive form "to learn."

Many people in England like to pronounce the word as Atkins does, so a note on its pronunciation will not be amiss. To Atkins the word appears as "them Saiks," to the European in India it is "Seek," while in the vernacular rendering it is "Sick."

Are the Sikhs one of the many races of India? They are not. They form a portion, a very small portion of the great Aryan race which entered India from the Central Asian crucibles of mankind, far away in the mists of time, who have followed in comparatively recent times a Hindu reformer. Sikhism is a religion, and any man may become a Sikh and no man is born a Sikh, though as a Christian is usually born of Christian parents, so speaking generally, to-day a Sikh is usually—but not necessarily—born of Sikh parents.

India is a country of close on 320 million inhabitants. Of these 320 million some 25 million inhabit the Punjab, the land of the "Five Rivers." Of that 25 million some $2\frac{1}{2}$ million are Sikhs. That will allow us to adjust our horizon. At the same time being a hardy race with a recent military history, their proportionate importance in enhanced thereby. But as a community they are not so large as South Ireland.

Now at the time when men's hearts were greatly stirred in Europe over matters of religion, there arose this movement in Northern India which we call Sikhism. Fourteen years before the rise of Martin Luther, there was born at an obscure Punjab village of a respectable family of Khatri caste, one "Baba" Nanak. Nanak found himself greatly repelled by all the idolatry and evil comprised in the popular Hinduism to which he was born, and he acquired knowledge of all that was good in the teachings of the world.

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He taught that there was only one God. Neither Allah nor Ramah, but one God for all, and that all men were equal before God. He inveighed against ceremonial, pilgrimages, idolatry, hypocrisy, slander, the immuring of women, and the cremation of living widows. He inculcated loyalty, gratitude, philanthropy, justice, impartiality, honesty and all those moral and domestic virtues which we like to describe as Christian. In fact he taught as many good men before him the ideals of the perfect life. And many there were who followed him, as their forefathers had followed the Buddha; for the eastern mind ever seeks a way of life. And a peaceful lovable set of quietists those first converts were, as ever sat under a roadside tree and ruminated on the world. And so many men found them.

"Man's patient quest for the secret
In soul, in star, in sod."

At any rate to those who flocked to hear the Baba preach, it was better than the old Hindu temples "With the organs of birth and the circlet of bones and the loose loves carved on the temple stones."

This was the first Sikh dispensation, the teaching of the good Baba Nanak, but it was not the Sikhism that drove the Afghan from Northern India or that bred the men who have helped to carry the *Pax Britannica* from the Great Wall to the Flanders flats.

Now Nanak was succeeded by nine Gurus or teachers, each usually nominating his successor, who taught and suffered at the hands of the Mogul Emperors for two hundred years and more, and then there arose the tenth Guru, the Great Govind, who inaugurated the second dispensation in the year of Our Lord 1675. It was the fifth Guru, Argan, who compiled the Grunth, the sacred book of the Sikhs from his own and his predecessors' teachings. The sixth Guru who led from 1606 to 1641 became a military leader and in some sort waged war against the Moguls. Which was cause and which was effect it is perhaps hard to say, but Islam does not tolerate unbelievers, especially those with a military turn of mind, which the Sikhs were displaying and they waged war to the knife with the followers of Baba Nanak. It was a troublous life and between 1664 and 1675, a matter of eleven years, no less than four of the Gurus lived, bled and died. Teg Bahadur, the 9th Guru,

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was put to death shamefully by Aurungzebe. There is a story told that the Mogul accused him of watching the Zenana ladies from his place of prayer, and the Guru said "Nay, but I look away to the future and see this race from the west that must fill your throne." At any rate, the end was a cruel one and a race of sweepers and outcasts, some of those outcast tribes who have tasted the lot of the conquered to the last dregs for many a hundred year, earned their admittance to the Sikh communion by retrieving the body. Since that day the Mazbis "the faithful ones" are a distinct portion of the body Sikh and a very important component of the Indian army, finding some of the leading Pioneer battalions.

Then arose the second Sikh dispensation with the teaching of the 10th Guru, the great Govind. Adding to the teaching of Baba Nanak a law of hardihood, he invited all those who would to join a military body of puritan soldiers. By his rules of hardihood and by five outward and visible signs shall they be known to all.

They shall maintain the *Kes* or unshorn hair and beard;
They shall always wear the *Kach* or short drawers of activity;
They shall be distinguished by the *Kara* or iron bangle that knows no gold;
They shall wear the small *Khandah* or small dagger;
And the comb of cleanliness, the *Khanga*, shall always be in their hair.

An outward and visible sign of the brotherhood was the common communion food, the *kara pershad*, that all should partake of on occasion from the common dish, the test that made many a Hindu shrink from joining, for it is a strong man that would jettison his Hindu pride of double birth in the common platter of equality. The followers of the first dispensation do not adopt these outward signs. After Guru Govind, there was to be no successor, the sacred book the Grunth Sahib, was to be the Guru.

Under the stimulant of the new dispensation the persecuted disciples who had already in the school of adversity risen to some military prowess, speedily developed into a powerful fraternity, warring with all and equally among themselves. That story however comes later as part of the story of the Sikh kingdom, and the race as we know it, "the fining pot for silver and the furnace for gold."

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Races and classes in the Sikh community.

It has been explained that the Sikhs are not a race in themselves but a religious community into which a man is baptised and not born. Racially, then, are the Sikhs a polyglot community? And the answer is yes and no. The community is pre-eminently but by no means entirely Jăt. That is to say it is largely composed of the race known as Jăt or Jāt. Among the great races that have come into India away back through the ages, conquering and enslaving the earlier occupants, one of the most famous is the Jāt race. Their origin and identity is a matter of discussion. Some folk believe them to be a Scythian race, the Getae, of the same stock as the Goths, nomad shepherds and graziers from the central Asian steppes. More modern opinion is now inclined to place them as akin to the Rajput wave that preceded it, an Aryan people from the same crucibles of mankind. These Jāts must have come via Kandahar and the Suleiman Mountains and Kach Gandava, conquering Sind and passing into Rajputana, whence they spread north into Delhi and the Punjab, while others will have come slowly up the Indus to the Panj-nad[1] and the Triniab[2], those lower waters that the five rivers joined to form. Large Jāt tracts and states gradually formed north of Delhi and south-east of the Sutlej. So we see this Jāt race spread over much of the Punjab and of Northern Hindustan. In support of an origin akin to the Rajputs we may quote an aspiration of the Hindu Jāts to be so considered, and a bait held out in that great Brahmin sub-surface intrigue that is always active, that an acknowledged Rajput origin with all that it implies, might be accepted by the Hindu world if the Jāt would join in some anti-British pan-Hindu upheaval. But that is "another story."

In the Punjab the pronunciation of the name has shortened to Jăt, i.e. Jut, while in the Hindu tracts near Delhi and Bhurtpore, it remains Jāt. In the Punjab the term Jăt is almost synonymous with cultivator. It is interesting to note that Colonel Sleeman, the Indian political officer famous in his day and wise beyond many, wrote when Resident at the Court of Lucknow, to his young friend Prince Dhulip Singh (a Jăt Sikh) when the latter was changing his

[1] Five rivers in one.
[2] Three waters in one.

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place of Residence from Fattehpur to Kent, in this wise. "You will be among your own race, as the men of Kent were Juts from Jutland," and he was very likely right.

When Islam swept into Northern India, with the hordes from the north, and the Arab invasion of Sind came from Basra and worked up the Indus, many of the Jăts of the five rivers accepted Islam. But that did not alter their racial description of themselves, any more than did the Anglo-Saxon cease to be such when he adopted Christianity. When the Sikh teaching arose, the major portion of the people in the Cis-Sutlej, that more or less homogeneous Jăt area, with their chiefs turned to the new teaching and eventually became the Sikhs of the Malwa. Gradually, too, many of the Hindu Jăts of the less homogeneous agrarian community, of many tracts trans-Sutlej, also became Sikh, and they are generally known as the Sikhs of the Manjha. The bulk of the Sikh community therefore consists of people of this great race of husbandmen of the Manjha and the Malwa. The Sikh people are true husbandmen by nature, heredity and instinct, as are most of the people of India, the people of whom Sir Alfred Lyall wrote :—

> And the ploughman settled the share
> More deep in the sun-dried clod—
> Mogul, Maratha and M'lech from the North
> And white Queen over the seas
> God raised them up and droveth them forth
> As the dust of the plough-share flies in the breeze
> But the wheat and the cattle are all my share
> And the rest is the Will of God.

But above and before all in devotion to the plough is the Jăt Sikh. His sayings are all of the plough, and his babies know no other toy. A powerful quarrelsome folk, carrying great iron shod quarterstaves and ready enough for a bout at any time.

In Northern India will be found of the great Jāt race;

i. Jāts in the vicinity of Delhi and Bhurtpore who are Hindus and call themselves by the long "ā." They have been long known as fine patient soldiers, and in the Great War came to the zenith of their military reputation. But they have nothing to do with Sikhs as such.

ii. Jăts in the Punjab forming the bulk of the Sikh people.

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iii. Jăts in the Punjab who are Moslems. And it may be said that many who are of inferior race have adopted the name because they too follow the plough.

iv. Jăts in the Punjab who are neither Sikh nor Moslem, but who follow the old faith in its many ways of life, viz. are Hindus of Hindu parents, or perhaps are the children of Sikh parents who have never been baptized into the stricter life.

But Jāt or Jăt Sikh, Hindu or Moslem, they are one and all husbandmen of merit, patience and perseverance, seeking to make two blades grow where one was, looking for the rain to rain, and the sun to shine in due season "and the rest is the will of God." And to such as these, as will be described later, the pouring of the water on the land by British engineering enterprise, has brought prosperity untold, so that many have become that very bad thing "*dunya-dar*"—(world possessing) which as any Indian philosopher will tell you is at the bottom of many troubles.

The Jăt Sikh is he that furnishes the bulk of the Sikh soldiery. But though Jăts do form the bulk of the Sikh race, they by no means form all. Sikhism being a militant community of titular equality, many other folk have joined it. The trading classes, the carrier classes, and many folk who minister to a large agricultural community joined the brotherhood, and partly because of the hardiness of the north, and partly nay greatly, owing to the tenets of the faith became also of military value, which in the curious constitution of the East is rarely the case in other parts of the Indian land. Some of the Sikhs of the clever trading class have become great soldiers and officials, whose hand did keep their heads, which once again is not the case elsewhere, whereby hangs so much of the real political truth of India of to-day.

The Rise of the Sikh Power.

The dramatic shortlived rise of the Sikh power is really the rise of the younger and vigorous brother of the original religion. It is the rise of the Singhs, with no doubt the good-will and admiration of Sikhism as a whole, and it happened as told below, to end in as horrible an orgy of power gone wrong as the world has ever seen. The inauguration of the militant brotherhood of hardiness soon

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raised the growing defensive power of the new religion. But among the main roads still marched the triumphant Moslem, in that particularly ruthless and hardy form the Duranni, the Race of the Pearl who claim to be the "Ben-i-Israel." Fierce was the warring and reprisals between the Sikh and the sons of the Prophet and never a hint of quarter. So fresh to this day does the story of bitter ruth run, that only the discipline and great spirit of the army of Northern India, keep Afghan and Sikh in the ranks together.

There came a time in the development of the Singhs when a man was to arise and weld for the short span of one human life, those chiefs and barons and freebooters into a race, freeing the land of Moslem rule, and bringing under one sway the whole of the Punjab. Ranjit Singh, the Lion of the Punjab, was born in 1780 the son of a land-owning baron who was head of one of the Misls and rose as a young man to fame as a leader of horse capturing the Lahore city when he was nineteen. The Sikhs in their increasing power had gradually formed twelve great groups or *misls* which to some extent resembled the clan of some great tribal chief. These groups of families and their followers knew no common head, and while combining against a common enemy were constantly at war among themselves.

By prowess and force of character and every ruthless and crafty practice Ranjit Singh eventually made himself the dreaded head of all these groups. Turning then on the neighbouring Rajput hill chiefs he reduced them to vassalage and finally conquered the Afghan provinces of Mooltan, Peshawur and Kashmir, incorporating them in his Kingdom of the Five Rivers. Small of stature, disfigured by small-pox, blind of one eye from an injury, nevertheless his glare and presence hypnotized all. Fakir Assizuddeen, his wise agent and minister, once told the Governor-General that he did not know which eye the King was blind of, so confused was he always in the presence.

Ranjit Singh first came into touch with the British in 1805, when Lord Lake had chased Holkar and his Marathas to the Sikh boundary and that free-booter chief in his despair had tried to get support from the Sikhs. Impressed by the order and discipline of troops trained on European lines, he set to work to form such a force. French aristocrats, officers from Napoleon's armies,

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Americans, English deserters, half-bloods, all joined the motley crew that in curious uniforms commanded regiments and trained artillery. Of the famous ones are Avitabile Allard, Ventura, and Alexander Gardiner, the "Gordana Sahib," whose life by Colonel Pearse, throws much light on the ways of Ranjit Singh. The portrait of Gardiner entirely clothed in Cameron tartan, gives some light too on the extravaganza of the story. Sir Henry Lawrence in his younger days wrote a romance "An adventurer at the Court of Ranjit Singh," which produces what must have been the true colour. Accounts of the Maharaja's meeting with Lord William Bentinck the Governor-General at Rupar in 1831 and Major Barr's diary of his march through the Punjab to Kabul all give some light on what now reads as a fairy tale.

Sir Lepel Griffin, comparing Ranjit Singh and Napoleon, writes "Men of military genius, absolutely selfish, pitiless and immoral . . . . but the power they seized they could not transmit to others. There were none to come after and Ranjit Singh knew it. Of all the queens and concubines, of all the dancing girls and courtezans who thronged the court one son, legitimate or otherwise, was born to Ranjit Singh, viz. Kharak Singh the imbecile."

The secrets of the Maharajah's Zenana were the common property of the Lahore Bazaar. The old King knew well what the end must be, without an adequate successor, saying of his map that some day it all would be red, for though he thoroughly understood and trusted the English he knew they must absorb disorder. "His possessions like a faggot of sticks gathered together during his life time, by the force of his imperious will fell asunder the moment the restraining bands were severed." [1]

Shortly after signing with Lord Auckland and Shah Sujah the Tripartite Treaty to restore the latter to the throne of his fathers at Kabul, and wondering perhaps behind his inscrutable face, how the English would get themselves out of that mess, Ranjit Singh quitted the unholy scene of his triumphs.

And then arose eight years of such evil and license and misrule as make the worst days of the Roman Empire pale. Kharak Singh and the bastards of Lahore quarrelled over the inheritance of the Lion of the Punjab, murdering and being murdered in turn

[1] Lepel Griffin. Ranjit Singh. Rulers of India Series.

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by the various chiefs and confederations that took a hand at king making. Kharak Singh the only true heir was murdered by his son Niao Nihal Singh and his unwilling wives were thrust alive on to his pyre by the soldiery. The orgy of murder and intrigue and lust continued till at last some sort of order evolved and the nominal throne was vested in the putative heir Dhulip Singh, his mother being regent. Finally the army, ruling through their *punches* or councils of five, caring nothing for the Rani or her son, a danger to all and sundry, were persuaded to fling themselves on the British.

The recently retrenched army of India with difficulty withstood this inroad, but finally crushed the Sikhs after four fierce battles at Sobraon on the banks of the Sutlej and marched to Lahore. Anxious not to annex, the British set up a Sikh Government during young Dhulip's minority, using the best elements available, with Sir Henry Lawrence as Resident advising the ruling council, and with a British supporting force at Lahore. But the best laid plans gang oft agley. The smarting of the Sikh veteran army after its defeats, intrigue galore, discontent with attempts at honest rule, all combined to destroy the situation we had tried to create. Eventually most of the Sikh Governors, their generals and their troops became welded into a concentrated force bent on trying conclusions once again, aided by a special contingent of Afghan horse sent from Kabul while the disbanded soldiery flocked back to the colours. And try conclusions they did during the hard-fought drawn battle of Chillianwallah, and the crushing defeat at Gujerat on the 21st February, 1849, that ended once and for all the Sikh rule, since the British had now no alternative but to annex.

THE SIKH AS A SOLDIER.

Of the Sikh as a soldier a great deal is to be said, but some misconception and want of due proportion often exists, and when we talk of the Sikh in a military sense we mean the Singh. It is popularly supposed that the armies of the Sikh Government with which we contended so fiercely in the Sutlej Campaign of 1845/46 and the Punjab Campaign of 1848/49 were Sikh. But such is by no means the case. There were of course thousands of Sikhs in the armies, for it was a state in which the Sikh was the dominant partner. But the size of the Sikh population being then as now

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a ninth or tenth of the whole, it is obvious that they did not form the whole Sikh army. Indeed far from it. The army of the Khalsa was in fact very much in its racial constitution like our own Northern army, formed of the various fighting races of the Punjab. The Rajput Muhammadan tribes then as now flocked to the standards of the *de facto* ruler, the Dogra (the Rajput Hindu of the sub mountain tracts), who off the main track had avoided both Islam and Sikhism, also readily served. Especially was this so in the contingents provided by the notorious Jamoo brothers, Gulab Singh, Dhyan Singh and Suchet Singh. Singh, the Lion, it should be remembered was the appellation of every Rajput long before Guru Govind adopted it, to denote the followers of the second Sikh dispensation.

The Gurkha too figured in the Sikh as in the British ranks. It will be remembered that it was a Gurkha corps belonging to the Sikh Durbar, escorting Agnew and Anderson to Mooltan to superintend Mul Raj's surrender of the Diwanni, which failed to protect them from mutinous Durbar troops and city rabble. The Gurkhas had long been in touch with the Sikh, for Ranjit Singh had found it as necessary to stop their encroachments into the Punjab hills as the British had further south. Driven from Kangra by the Sikhs and from the Dun and the Simla hills by the British they eagerly enlisted with their conquerors.

So the long and short of it is that the British Army's desperate victories were won against troops constituted of the same elements as those which the British now train and lead so successfully themselves. In other words they were by no means all Sikh. This is a point well worth remembering, for the Sikh is an arrogant person and is quite inclined to believe that it was he and he alone that cowed the Bengal Sepoy, and made the British Line fight as it seldom had to fight before.

Similarly the Sikh likes to believe that it was he and he alone that saved the British raj in the north in '57. That again is a misconception. Many a gallant Sikh soldier, horse, foot and artilleryman of the disbanded old Sikh army hurried to join the British and share in the sack of Delhi, but all the other lads in the Punjab were equally eager, once the British had shown they were men, and meant to weather the storm; Hindu and Mussalman,

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Trans-border freelance, Ghukkar, Tiwana and Dogra, and all the rest. And if any one wants to know what they got for their pains let them read the accounts of the "Return of the Guides" from Delhi to the Frontier.

So again remembering that the Sikhs but number two and a half out of twenty millions let us mix our idea of their previous prowess in somewhat the same proportions, which does not in the least mean that the Sikh soldiery have not rendered very great services and have not been among the best of our Indian troops. But the army by no means thought much of them in the forties. The first Afghan War had been undertaken with Sikh allies. Disorderly and not very effective Sikh regiments and batteries had accompanied our troops to the mouth of the Khyber, and had with difficulty been persuaded to enter the pass and face the tribesmen. Ranjit Singh was dying or dead, the best of his European officers were old or had left him, and only the poor stuff remained, and though a Sikh contingent eventually accompanied Pollock's avenging army to Kabul, it did not contribute to the getting there. It was this knowledge of the ineffectiveness of the Durbar troops in 1839-42 that was responsible for the rude awakening to our own troops when we had to fight them a few years later.

Sikhs and other Punjabis were not enlisted into our armies save perhaps for a few irregulars, till after the Sutlej campaign. In 1847 troops were raised from the disbanded Punjab soldiery to form the irregular force that was to garrison the Jullundur Doab, after its surrender by the Sikh Durbar, as a part of the reparations for the unprovoked act of war. But these men were enlisted from all the Punjab races. Two local Sikh battalions were also raised in 1847, the Ferozepur and Ludhiana battalions. The Bengal Line was also ordered to take a hundred Sikhs into each battalion. It is interesting to note that the wild appearance of Sikhs who had not then picked up the Rajput and Hindustani trick of curling the beard much irked those commanding officers who attached importance to the smart and regular appearance of their men on parade, and many of them tried to evade the order, and even to persuade the Sikh to trim his hair! It is also interesting to note that these Sikhs stood cheek by jowl in the ranks with the Hindustanees and joined them when they mutinied a few years later, though it is true

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that many were reclaimed as the mutiny wore on. In 1856 the Bengal military Police Battalion of Sikhs known as Rattray's Sikhs were raised.

After the great flare up of 1857, the places of most of the Bengal Line were taken by irregular Punjab regiments enlisting many Sikhs. When the reconstruction came, most of these corps and the three local Sikh Corps, were formally embodied in the Line, the latter as the 14th, 15th and 45th Sikhs. In the new Punjab regiments horse and foot, the various classes were grouped in separate companies, instead of standing mixed in the ranks, and so they remain to this day, while each of these corps had one or more companies or squadrons of Sikhs.

During the siege of Delhi, invaluable pioneer corps were raised from that menial class who had been admitted to Sikhism as has been related for retrieving the body of Teg Bahadur the sixth Guru, and known as "Mazbis." From these were formed the 23rd Pioneers and 32nd Pioneers, and later the 34th Pioneers, recruited from the same class, were also added to the Line of the Bengal Army. These six units formed originally the only purely Sikh units of the army, though most of the Punjab battalions and cavalry regiments had Sikh companies and squadrons as explained above. The four local battalions raised for service in the Jullundur Doab in 1847 were after the Second Sikh war (the Punjab Campaign of 1848-49) transferred to the new Punjab Irregular Force that was being constituted for service on the Afghan border, as the 1st, 2nd, 3rd and 4th Sikh Infantry. In this case, however, the name "Sikh" referred to their evolution from the old army of the Sikh Government, and not to their racial constitution, as the corps never contained more than a certain proportion of Sikhs. It however became a colloquial habit to call them the 1st, 2nd, etc., Sikhs, and this habit was continued when Lord Kitchener brought them into the general Line of the Army, as the 51st, 52nd, 53rd and 54th Sikhs.[1] This should be borne in mind when estimating the part played by the Sikh in the Indian Army, as these so-called "Sikh" corps are only partially Sikh, while the 14th, 15th and 45th[2] Sikhs are purely Sikhs as well as the 23rd, 32nd and 34th which are Mazbi Sikh.

[1] Since 1922, grouped as battalions of 12th Sikh regiment. (F.F.).
[2] ,, ,, ,, 11th ,,

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After the Russian war scare of 1885, when the Indian Army, reduced after the Afghan War was again increased, the vacant numbers, the 35th and 36th regiments[1] of the Bengal Army, were re-raised from Jăt Sikhs as purely Sikh Corps, while in the later days of Lord Kitchener the 47th Sikhs[1] were also raised to fill a vacant number, also a purely Sikh Corps. Thus at the commencement of the Great War there were six purely class battalions of Sikhs other than Mazbis, besides the many Sikh companies and squadrons in corps that were not purely Sikh. During Lord Kitchener's time, as well as earlier, several of the corps of the Madras and Bombay Armies were reconstituted, taking their men from the north rather than from the south and this resulted in a further enlistment of Sikhs, though for the most part from classes other than Jăt.

The Sikh is a fine fighting soldier, and that all will admit. A somewhat thick-witted man he is hard to scare, and can fight an uphill fight better than most Orientals, and the old veteran Sikh battalions would merit that description of Napier's, fighting with that majesty which he ascribes to the British soldier in the Peninsula. He is soldierly to a degree, but big and slow to take cover, awkward on the hillside and in the jungle, until long exercised with hillmen who can stimulate his activity. The Sikh character has its defects. The Sikh is avaricious; intrigue to his own advantage is the breath of life to him, and he is prompt to be bumptious and above himself. Officers who know him will laughingly say that he must be heavily beaten once a week to be bearable. Officered as he usually is by first rate men his evil traits are kept in hand and his good ones are developed. Officered by weak officers who do not understand him he becomes a dangerous person. The Sikh gunners died at their guns before the British in the old wars and he now makes a good, if rather thick, artilleryman and an excellent sapper. As a cavalry soldier he retains the fire that made the Sikh horseman of Ranjit Singh so famous.

If the British officer of the Indian Army will not admit that the Sikh is *the* best Indian soldier, they will place him in the front rank of those whom they love and cherish.

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[1] Now battalion of the 11th Sikh regiment.

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II. MODERN TIMES AND PRESENT TROUBLES.

The Punjab under the British.

Under the seventy odd years of British rule that lay between the annexation and the Great War, the war-swept savage Punjab has attained to such wealth and prosperity as none had ever dreamed of. Roads and railways have spanned the land north, south, east and west, trade and agriculture have flourished and increased a hundredfold. Thousands of miles of profitless scrub jungle and waste land have been reclaimed. The gradual harnessing of the five rivers each with bigger dams and headworks than ever were sung about in Egypt, has brought millions of acres under the colonists' plough. Every April the Punjab is one vast cornfield, and all signs of the devastation left by thousands of years of inroads have long disappeared. Of this prosperity the Sikh farmer has had his full share, and waxed fat. He sells his corn at high prices and exports it by the thousand tons to Europe, and has rested content. After the mutiny of the Bengal Army, and the civil uprisings that accompanied it, the Punjab having rallied in its thousands to the British side thanks to the enduring courage of John Lawrence and his officers, development, good will and prosperity were the order of the day. Troubles there were many, and mistakes to be rectified by experience, not a few, but Lahore became a great modern capital with colleges and university, with its High Court and its flourishing bar, agricultural and scientific centres and the like.

Below it all ran at times that never dying undercurrent of sedition, of worship of ancient tradition and past glory, or of religious pre-eminence that rulers of India have suffered from for all time, and which our Moslem predecessors have experienced far more than ever have the British.

The Punjab and the Sikhs have in common with all India gone through that period in which the educated classes were following the lesson and teaching of democracy set by the Mother of Parliaments. They have also in common with the rest of India endured with some dismay the rise to power and influence of the legal classes. As in the rest of India, conditions have arisen in the Punjab which have made the more far-seeing Englishmen realise that their

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task of building would soon demand a change of system. But the harder manlier Punjab has not suffered to any great extent the seditious hysteria of vain imaginings that from time to time have swept more southerly provinces in the last fifty years. A harder folk, their appreciation of values is more correct. Also have they seen almost within the memory of man Afghan invasions sweep into the land, with all that such stood for in times gone by. The which gives sober folk to think.

But from time to time serious trouble has arisen. In the seventies an attempt to start a movement of religious reform and return to the purity of the original dispensation combined in its programme the restoration of the Sikh kingdom and had to be sternly repressed. Various movements have come and gone or developed, sometimes Islamic, whenever Turkey was at war with Christian neighbours, sometimes Pan-Hindu, re-acting to Brahminism from the south, sometimes purely Sikh aiming at the restoration once again to Sikh power. Once in Lord Kitchener's days it was necessary to break up and distribute a group of Sikh regiments which happened to be stationed near one another. Indeed even in these days, aweary lies the head that wears an Eastern crown! Slowly the indulging in sedition for sedition's sake and the cult of anarchy worshipped as the cult of Kali, was running underground. This movement has always been uncannily clever in misrepresenting whenever possible, all and every act of authority. Every freak of climate, every vagary of disease has always been attributed to the actions of government and especially of the English, as others have suffered before us. Harm incalculable has been done, but harm to Indian and not to English interests.

It is curious to notice a phase of the Sikh story, that was apparent in the last decade of the 19th and the first decade of the 20th centuries, when Sikhism or at any rate Singhism, the following of the Second Dispensation, bid fair to die out. Its hard and restrictive tenets were irking to the young men of the rising generations, who were lapsing either to the easier ways of the first dispensation, or the laxer life of Hinduism, and its austerity and lack of attractive ceremony did not appeal to women. The sons of Sikhs were omitting to be baptised into the Sikh religion and to assume its liabilities. Then curiously enough it was the British

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officers of the Sikh regiments, companies and squadrons, who kept the sacred fire alive. Knowing all that Sikhism makes for in manliness and the soldierly virtues, they insisted on every son of Sikh parents being baptised ere he was sworn into the colours, and the *grunthis* or lay readers were encouraged in every unit in their duty of instilling the old faith and its virtues. Since then the Intelligenzia have taken up the revival but for many years the British officers almost alone stimulated the religion which bid fair to die out before modern ease of life.

During these seventy years the Sikh soldier had served us all over the world, acquiring great reputation thereby, and he had flocked far afield to China, the Malay States and to British Columbia, serving as policeman, night watchman, or in local corps. Where money was to be made by service there the Sikh flocked. Among however the results which this flocking overseas has brought has been the repatriation of an anarchical body of Sikhs from British Columbia with certain forces behind them, who for various causes have been perhaps more dangerous than any other particular lot. Establishing themselves of late in the Jullundur Doab, they have endeavoured to terrorise the whole community by ruthless murder and to divert some of the Sikh movement to their ends.

The Great War.

Up to the period of the Great War, however, government have always managed to handle the situation, leading what is good into the channels of self help, municipal government and immense agricultural development. When the war broke out there was a rally of the gentry, the real trading class and the warrior classes, especially those of the Punjab. But it is a mistake to think that India rallied so whole-heartedly to the Empire that no reward can be too great. India as a whole was largely reluctant and it was only the knowledge that in war time England was not likely to maintain her usual kid glove contempt for those who would destroy law and order, that kept the seditionists and anarchists within bounds. They gave the government, however, very great anxiety and needed constant watching, which did not prevent serious tampering with some of the troops especially at the

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beginning. The Punjab, however, did play up in a most remarkable way, and poured men to the ranks. The sedition party even here were hard at work underground and succeeded in producing the Punjab rising of 1919, of which the suit so successfully brought by Sir Michael O'Dwyer, the late Governor of the Punjab, against his traducers is an aftermath. The great agricultural races held firm by the British, and the Sikhs, Moslems and Dogras were worthy of themselves and all that has been done for them. But the war ended with the disbandment of thousands of temporary soldiers, roaming the countryside trying to buy cattle with their savings. High prices, high talk, high stomachs, and sedition mongering, produced that extraordinary rising in the Punjab or certain parts thereof in the spring of 1919, when the murder of Europeans at Amritsar was followed by the military action there and at other centres of disturbance.

The rising was followed closely by a new trouble. Misled by events in India, stirred by the pan-Islamic cry, or possibly like the Sikh Durbar in 1845 anxious to relieve the tension at his own capital, the Amir of Kabul elected to hurl his forces to their undoing on the British. It was an anxious time with the army in India in the throes of demobilizing, and the eager combine of our own tribes on the border with the Afghans did not make it easier. However, the storm safely weathered, government commenced the introduction of that measure of democratic control, which rightly or wrongly, wisely or unwisely, had been devised as the best way to give effect to the recognised need for sharing more directly the higher functions of Indian Government with the Indian people.

It was a difficult time for any form of administration. The soreness after the rising, which some would like to call merely an ebullition, years of bad rain and high prices, all complicated the situation, but it may safely be said that the Government of the Punjab were prepared to handle the difficult problems of the new situation. Heaven knows they were difficult enough, this pouring of new wine into old bottles, without entirely outside and gratuitous trouble. But those who rough-hew our ends, found an unforseen situation suddenly opening on them at a time when any acerbity was most unwelcome. This took the form of a most absurd and illogical religious trouble.

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THE SIKH TROUBLES.

In the general situation in the Punjab at this time, with all its movements and its counter movements Mr. Ghandi must of course bear a hand, and every other bird of political omen good or evil, but the trouble among the Sikhs has been indigenous and religious entirely, in its primary arising, and to follow it we must go back to the opening description of the Sikh religion. As no man can get away from his shadow so can no political or religious situation get away from its past. The past in this case is the two dispensations, the Sikhism without the vows of the Singhs, and the vows and revived status of Singhism, saved by British military officers to overflow into the chaldron of politics; and the fact that Sikhism derives from Hinduism, and without baptism for each individual lapses thereto by default.

The trouble of to-day is to define who own the Sikh shrines and what constitutes a Sikh. In outline the story is as follows. The Sikh shrines are of two natures, those which are conducted by members of the various Hindu monastic orders as priests in charge, and those which are in charge of purely Sikh priests. The first are the religious places of worship of all Sikhs whether "Nanak-punthi," i.e., of the first dispensation, or "Singhs" of the second; and in the second category are the purely Singh "Golden Temple" at Amritsar and five affiliated temples. At the time of the annexation by the British when all claims and rights to lands were recorded, the temple lands were duly registered as appertaining to each particular temple, passing to such custodians and successors as custom might warrant. There was no body who could claim authority over these Sikh shrines, some 260 in number, or in whom their land and revenues were vested. The Singh shrines proper, viz., the Golden Temple and affiliated temples have since the annexation been controlled by a Sikh Committee, of which the Sikh president by the general consent of all for the avoidance of friction and discussion, was appointed by the Government of the Punjab. Further, also with the consent and desire of all, the Commissioner of Lahore has to some extent acted as trustee for the lay business of the temple affairs.

Now the Sikhs of the old dispensation outnumber the Singhs as may easily be realised by the number of temples and shrines other

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than the Amritsar group. How far the Singhs will admit the others to be Sikhs is uncertain, and the whole story of the trouble is wrapped up in the definition of a "Sikh." Ages before the days of the British, has existed a semi-militant, semi-religious body termed the "Akalis," who perpetuate all the glories of the tenth Guru. Clothed in blue, wearing ostentatiously all the five "K's" and as much iron and weapons as the law will allow, they are vociferously present on any occasion of note in the Punjab. Old soldiers of the Khalsa and old soldiers of the British have joined and still join their ranks in large numbers. Turbulent and impudent, old Ranjit Singh gave them short shrift if they interfered with his authority. Now this organisation suborned partly by the genuine Sikh enthusiast, partly the tool of the underground organisations who will turn any tool against authority, has taken up the attitude that Sikhism is in danger owing to idolatrous and Hindu practices. They first of all threatened to interfere with the Golden Temple. Government have for some time realised that official connection with the Golden Temple group was no longer necessary and was growing out of date. Sir Edward Maclagan, the Lieutenant Governor (as he then was) of the Punjab announced in 1920 that as soon as the new legislative assembly was formed he would ask the Sikh members to frame general rules and principles for the management of these shrines without government help. But the reformers would not wait and actually took possession of the temple. Government, on the advice of one of the Sikh princes, formed a Sikh committee to advise them at once. This committee never made a report, but entirely *ultra vires* co-opted several more members and took control of the Golden Temple group styling themselves the "Shiromani Gurdawara Parbandak" Committee (i.e. the Committee with the control over all Sikh Shrines). Sir John Maynard has adopted a short title in his reference to this, calling it The Central Religious Committee.

Unfortunately this committee which had it been supported by all Sikhs might have been recognised in spite of its methods of action as a Sikh authority, fell at once into the hands of the anti-governmental wire pullers. It and the Akalis then tried to gain control over the 260 other shrines. That the religious control over these shrines was insufficient was notorious. In many cases the

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incumbents had become immensely rich and accounted to none for their revenues. Temple lands had greatly appreciated with the new irrigation. Many cast envious eyes thereon. It was as if a coal mine or auriferous soil had been found beneath a glebe field. Also in many cases the incumbents were by no means living decorous lives and were a scandal to the decent and religious minded of the community; so do old stories repeat themselves as religions deteriorate.

It was obviously high time that the Sikhs as a whole should combine to put their affairs in order. Government frequently urged some Sikh to produce an agreed bill in the assembly, when government would help it through. But none would come forward. As well ask the warring Christian communities to do the same. Then government virtually asked some authorised body to bring civil suits to obtain the land from the incumbents, but none would do so.

Then the Akalis and their adherents announced their intention of seizing shrines. Government, short of constables and anxious to avoid interference in religious matters preferred to wait for a complaint to the police of ejection, rather than use their scanty constabulary for prevention of what might be but rumour. But shrines were being seized. Then came a rumour that it was intended to seize the famous Birth-place Shrine (the birth-place of Baba Nanak) at Nan-Khana not far from Lahore. The seizure took place a fortnight earlier than was expected. The district head-quarters was twenty miles away, and the nearest police station ten. The incumbent had provided himself with some guards and a number of hired bravos, many of the Moslem faith. A band of one hundred and thirty reformers arrived at early dawn surprised and evicted the custodians' guards, and proceeded to carry out worship. The incumbent and his bravos shut the doors, poured in oil, sat on the outer wall tops armed with firearms and burnt the lot to death. Authority arrived to find a quivering mass of half-burned dead and dying. Sikh excitement boiled over, and a large body of troops was necessary to prevent disturbance spreading. The debatable shrine was made over as soon as could be to some suitable temporary custodians, and government sought vainly for someone in the Sikh community who would help decide what was

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a Sikh, and what was a Sikh shrine, and who would form some Sikh religious authority. In the meantime they very properly decided in the cause of law and order and governmental duty that they would protect all temple incumbents who wished it, until such time as a trial in the courts, or some adequate body of the Sikhs, should evolve a policy.

It then became a point of honour among the Akalis to try and injure shrine property or gain possession of the shrines. It became a point of honour and pilgrimage to be beaten by police staves for the faith. To cut wood in the Guru-ki-Bagh or shrine garden became a test. All over the Punjab religious Jathas were formed, miniature crusades would go and testify and be beaten and lie across the road so that police or army motors should not move; for the world loves a martyr. And the story flew round the good agricultural communities whence the soldiers came, that the British Government were fighting the faith. Boys on leave from Sikh regiments came back mutinous, believing the story, and old army pensioners who should have known better, grasped their iron shod quarterstaves and were longing to be at 'em. And all the while the seditionists stirred the flame, and the good kind government stood rather helpless and hopeless, only too anxious to help and averse to strong measures if they could be avoided. Sikh regiments were quietly moved as far away as possible, and the district officers of the old type cursed all mischief-makers, and wondered what John Lawrence would have done, as well they might. It was a sad bother, not helped by a tremendous rise in the price of foodstuffs in 1922, and the whole Sikh community grew sour and surly, while the rest of India has a bad example before them.

Then another trouble arose. The Maharajah of Patiala and the Maharajah of Nabha, two Sikh ruling princes, fell to loggerheads. So fierce were the recriminations and so sorry the strife that government appointed a special Judicial Commissioner to hear the accusers' story—one against the other. And his judgment revealed such a horror of maladministration and injustice on the part of his Highness of Nabha that that prince wisely immediately resigned his throne, and the Governor-General declared a regency in favour of the Maharajah's infant son. A glorious opportunity to cry out against government's persecution of Sikhs! The Akalis proceeded

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to testify at Nabha and in Nabha territory, and to raise every sort of ferment and all good Swarajists joined therein. Happily, well disposed Sikhs knew the true story but it has been only one more unmerited thorn in government's side.

And so it has worn on through 1923, till in 1924 it was obvious that the movement was not going to produce speedily its own anti-toxin, and that action of some kind was necessary. The Government of India tried a new experiment and deputed a soldier, a *persona grata* with the whole Punjab and especially with the Sikh soldiery and gentry, to preside over a committee to discuss and present the Sikh views and remedies. Sir William Birdwood was asked by the Viceroy to undertake the duty, but the sullen and suspicious state of the Sikh mind prevented influential Sikhs coming forward to serve on the committee, and it fell through. The various preliminary visits and conferences that Sir William held with all and sundry cleared the air and helped to produce a more favourable atmosphere which Sir Malcolm Hailey, the new Governor of the Punjab, has developed and in which he has been able to conduct the shrine trouble to a conclusion. A bill has now been brought forward in the Legislative Assembly of the Punjab by the Sikh party, which settles the disputed points. How far the bill will settle the dispute between the two divisions of Sikh thought yet remains to be seen, as it undoubtedly favours the claim of the Singhs. If the Sikh community accepts this solution all will be well, and in any case the problem will change from one in which for no good reason odium had turned against the government, to one in which as in the beginning of the quarrel, the issue will be one with which the Sikhs themselves are really alone concerned. During the last twelve months or so many societies have arisen in the Punjab as in other parts of India for the support of government and the promotion of good will, while Sir Malcolm Hailey in his tours through the Sikh districts has been congratulated by many communities on the suppression of the lawlessness which had been rife owing to the action of the Bhabbar Akalis and other bitter seditionists. Those who know and love the Punjab may hope that a better atmosphere has come to stay, that will allow of the immense prosperity that has arisen from government's irrigation schemes and other developments of the last twenty years being

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fully enjoyed, while in the army the disturbed feelings which to some extent unavoidably spread to the Sikh units should entirely disappear. At the same time there are few who would care to prophesy as to the course that self government and development is likely to take in the Punjab or in the rest of India. Britain has laid a wonderful foundation if the people will follow it, but the machinations of those who plan chaos, only a shade more dangerous than the promptings of those whose "hearts are full of gold and whose heads are full of feathers," will always tend to upset a country that has become strangely inflammable.

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"THERE IS A HAPPY LAND . . . ."

By Lieut. H. W. Fane, late R.A.

I THINK it would puzzle most people if they were to try and find a map of the Northern Transvaal, which would give them any adequate idea of the country. I have studied many of them and failed utterly to reconcile them with the actual country. Curiously enough the most informative that I know is the Standard Railway Map. And yet this part of the Transvaal has been inhabited, though sparsely, by white men for a good many years. The area in which the map-maker has been most hazy is the Zoutpansberg, and even Johannesburgers have some hazy ideas about it.

The Zoutpansberg is about 180 miles long from East to West, and about 80 miles wide, and is named after the range of mountains running through it, which in turn take their name from the salt-pan lying at their western end. In 1899 the railway line was opened to Pietersburg from Pretoria, and for twelve years Pietersburg was the end of the world. In 1911 civilisation made a push to Bandolier Kop, and Bandolier Kop thought that it was going to be a little Babylon; a big hotel was built, stores were opened, and then the railway pushed forward again, and Bandolier Kop was left stranded. The next step was Louis Trichardt, which was railhead only for a few months, and then the railway drove through the mountains and on to Messina. Now Bandolier Kop is on the southern boundary of the Zoutpansberg and Messina is on the north, and if you look at that excellent publication "The South and East African Year Book for 1922," issued by the Union Castle Steamship Company, you will find the whole thing dismissed in a page and a half. Messina is only five miles from "the great grey-green greasy Limpopo river," and that is at present the end of our world, though one of these days we hope that the railway will join up with the Rhodesian railway at West Nicholson only 126 miles further on, and become the main line to Bulawayo. So, you see, the Zoutpansberg can only be said to be 13 years old, and yet what

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a lot has been done in that time. Though Bandolier Kop has failed to mature, Louis Trichardt is a flourishing little town, growing daily; and Messina, though only a mining camp in name, is not far behind.

In spite of all this talk of railways, I would strongly advise any visitor to leave the train at Pietersburg, and come on by car. The trains do not exactly rush across country, and the motor road is excellent, the latter part from Louis Trichardt to Messina having been specially repaired for the Prince of Wales's visit. Happy the man who drives his car from Bandolier Kop down the long straight road to Louis Trichardt. At first the bush hems him in on either side, but as he nears the town the land is cleared, and he can see the fat rolling country with the mountain range gaining in height as he approaches. They are no forbidding heights, but a long line of tall broken hills, the lush grass and bush growing almost to the tops, where here and there the rocks break through to form warm-coloured cliffs against a sky as blue as the vaunted skies of Italy.

The traveller finds one pit-fall as he nears the "dorp," in the form of a stream which has to be forded; and then he runs into the town lying among the foothills of the mountains. His run has been an easy one, and he should consider awhile the difference between the long straight metalled road of to-day, and the track made by the pioneers of 40 years ago who came trading with the natives. They found the Tambukie grass high above their wagon-tents where now is good grazing for cattle. If it is early spring and the Kaffir-bloom is in flower, then every town garden has its tree of scarlet blossoms, or if it is later in the year there are hybiscus trees, oranges or carnations to make a splash of colour. One reads tales of Yankee townships sweltering and lazing in the midday heat, and many a South African country town recalls these stories, but, even on the hottest day, Louis Trichardt takes comfort from the water furrow tinkling down the side of the street, on its way to irrigate the gardens and orchards of the burghers.

Now for a further venture into the north, into the country where the maps are most imaginative, and from which the people of the south will tell you that no man comes back alive. At any rate, make an excursion into Wyliespoort. The first part of the journey is up the mountain past orange groves and fine grazing

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lands until the height is reached. Here stop a moment and look back across the country to the south. Where else did you see such a view of mountains and flats? Many a mile can you see in the clear atmosphere before the blue grey of distance softens the outlines. Miles of rolling bush country, one day to be developed into greater wealth than ever the gold reef or the diamond mines produced. Pursuing the journey, the road winds down into the heart of the hills between high banks covered with semi-tropical vegetation. At last the bottom is reached and the way leads into the narrow gap in the second range of mountains known as Wylies-poort. Here a brawling stream runs beside the road, crossing beneath it half a dozen times where space is cramped. Along the banks of the stream grow palms and reeds and flowering bushes, and in the cracks of the rocks trees and cactus, twisted into grotesque shapes in their effort to maintain their grip on the little patches of soil between the stones. The mountains rise sheer from the road in sun-kissed crags. Surely this is a charmed spot. There is no sound but the rush of the water under the bridges. Above us the bluest sky in the world rests on the summits of the multi-coloured cliffs, behind us and ahead the road twists through the narrow cleft, and the eagles sweep through on silent pinions. Some day this will be the happy hunting ground of the orange-skinning paper-bag-throwing tourist, but now it belongs to the eagles and baboons, and the name of a hotel scrawled in white on a roadside rock alone gives a hint of the bestialities of civilisation yet to come.

Let us return to the "dorp" as evening falls, dropping through the golden haze of the setting sun past grinding wagons with their long spans of donkeys or oxen, past the orange groves again, into the little town, feeling a little exalted and a little tired.

Now for a still bolder flight into the "back of beyond." After due warning about the dangers of the other side of the mountain, we will essay the trip by rail. First comes the journey to the station. "Why," you ask, "build the station four miles from the town?" Well, this is the story as I heard it, and I am quite sure it is not true. Once upon a time a certain railway engineer arrived at Louis Trichardt surveying the route for the new railway. He stayed the night, and played poker. He lost, and to annoy the people who won his money put the station four miles out from

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Louis Trichardt. However that may be, it is a source of wealth to garage proprietors that we must transport ourselves and our baggage four miles to the station. Here we wait for the train, regaling ourselves with coffee and biscuits if the South African State Railway has excelled itself.

The first part of the journey is uninteresting, as we travel along the flats a few miles from the foot of the mountain, and through a native location. The only sights we see are a few patches of crops, and a party of black yelling nigger children, mostly in their birthday suits. At the various halts groups of native women wander about in their sombre-coloured blankets, some of them with many yards of wire wound round their ankles. How one wishes that they would affect the gay colours of the East. But no, they still adhere to the dull reds and browns, which appealed to them in the days when flashing colours might be dangerous. If we are wise we get off the train for a cup of coffee at Mara Station, half to pass the time while the train shunts, and half because we may feel hungry before we get to Messina. After leaving Mara we enter the mountains, passing first the tall sugar-loaf sentinel, that stands at the entrance to the Poort.

What the geological significance of this cleft in the mountains may be, I know not. Somehow the Sand River has found this way through, and the railway has followed its leader. This Waterpoort is different to Wyliespoort which we visited before. Here is no crushing of the river between the cliffs. Rather has the river eaten its way into the sides of the hills as it swept round in flood. Here and there the railway passes under overhanging cliffs, but it is only to avoid crossing the river. Once it goes through a tunnel—significant circumstance. The next tunnel that I know of, on the railway to Cape Town, is a thousand miles away in the Hex River Valley. It may be that as you go through Waterpoort, the Sand River is a meandering stream wandering over its alternatively rocky and sandy bottom : but at times it can be in wicked flood, washing away its banks and ripping out big trees by the roots. Waterpoort is 12 miles long, and every inch of it a joy. Here the mountains open out a little to show the rich vegetation between them : here they rise in rich-coloured cliffs splashed and dappled with lichen and shadows, and here again appears a grey rocky slope devoid of

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life. Finally the railway sweeps under a cliff, round a bend, and out into the plain. This is the unknown land.

Here are many things which people will tell you are nearly extinct in the Union of South Africa. Here is game for you, and minerals, agricultural opportunities and timber. Here the koodoo come down like herds of cattle, and the sable antelope wanders. A little farther on or away from the railway are zebras, wildebeest, waterbuck, reedbuck, and a host of other game and lions. This is a rolling sandy country, with patches of heavy bush, a small rainfall, but a virgin fruitful soil. Here may be found platinum and corundum, copper and coal, all waiting their time. Here is a country where cattle are always fat, where the grass is always sweet, even to the last mouthful; and when that is finished there is the bush with its oil-bearing pods. A little further on the Mopani Bush begins, whose leaves are an all-sufficing fodder even when bone-dry.

And so the train meanders on, dropping off at every halt the empty cream cans that yesterday took the rich cream in to the creamery. After Mopani Siding the track begins to curve about as it makes its way down through broken country to the Limpopo Valley and at last, as the evening draws in, the station lights of Messina appear, and the journey is ended. Messina platform is always crowded when the train comes in. There is not much to be done when the work of the day is finished, and a stroll to the station to meet the train provides a pleasant and invariable recreation for Messina, and a welcome for the visitor. Now you have come to the northern limit of the Union of South Africa, and if you want to go into Rhodesia you must ferry over the Limpopo and work your way into civilisation from the other side by car.

Surely, I thought, when I first heard of Messina, here is romance. A mining camp on the banks of the Limpopo must be exciting, but an excellent dinner at the hotel, and a good supply of iced beer struck me as being too comfortable for true romance, and when no bar-ful of "hard-cases" eventuated in the evening, I came to the conclusion that Messina was a very ordinary little place. The only reason why it has not become a township is that it wishes to keep out the "coolie" storekeeper. This is not the place for dilating on the question of Indians in South Africa. It is

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a problem which has baffled cleverer men than me, and one which will not be solved without a lot of ill-feeling. Suffice it to say that Messina, like the rest of South Africa, does not care for Indians, and will resist their entrance as far as possible.

If you wish to return from Messina by rail, you must do so either on the next morning or wait for two days. The South African Railways do not run more trains than are strictly necessary, and one train running between Pietersburg and Messina manages the local traffic fairly efficiently, travelling up one day and down the next. Of course such things have been known as travelling on goods trains, but it is an experiment which no one cares to repeat, as the goods trains rattle and jolt and sway unendurably. However, the brave man might try it. Messina sends away much copper, and at certain times many cattle are loaded there from the Rhodesian Ranching Companies across the river, and goods and cattle trains are as frequent as passenger trains.

The railway line opens up to you a strip of country through the middle of the Zoutpansberg 80 miles long, but what lies to the east and west? "Terra incognita" is the answer. Blauberg (the blue mountain) lies away to the west, a massive block of mountains standing up in a rolling plain. To the east the Zoutpansberg range continues to split the northern plain from the southern, gradually dying away as it nears the Portuguese border. Most of the country has been surveyed and split up into farms, and some of them are occupied, but there are no royal routes driving into the countryside.

What of the inhabitants, them of the occupied farms? They are nearly all of Dutch extraction, and few of them can speak English fluently. They are poor, many of them, and owing to great distances, almost uneducated: but they are the spear-head of civilisation to whom we owe much. They take up the unoccupied farms from the Government, and break them in. Where they go the country is often malarious, infested with lions, and without any trace of the hand of man. Gradually the land is tamed and civilisation creeps up. They make a precarious livelihood from the game, a few cattle and a little patch of cleared land, and as the railway and the motor car arrive some of them are absorbed into the heavier population, but the majority pass on again into the unknown country, finding themselves unfitted for the pressure of modern

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civilisation. Here and there in the more thickly populated parts you will find farms occupied by those who originally trekked to them and broke them in, and made them; but more often these farms have passed through several hands before they came into those of the present occupier.

One often hears much contempt expressed for the "back-veldter" the "takhaar," but we owe a debt of gratitude to him for what he has done and is still doing. Without him many broad acres in South Africa would still provide food only for wild beasts, and the mosquito would still make life unbearable. As it is one hears with pity that this man has been killed by a lion, or another has lost two children from malaria, or a third one's son has been drowned by a crocodile. Their world is bounded by the bush which surrounds them and only occasionally do they visit the "dorp" for "Nachtmaal," the Communion Service of the Dutch Church. Many stories are told of their ignorance. Here is one. An old man, whose only knowledge of transport consisted of the ox-wagon with its long span of oxen, was visited by a friend, who had just returned from a visit to Europe. The old man listened attentively to a long account of the voyage, which ended up "And so I came back to Cape Town in a big ship, travelling night and day, without stopping, for 5,000 miles." "Well," said the old man, "I can believe all you have told me but one thing. I cannot believe that you travelled 5,000 miles without outspanning the oxen."

In these latter days South Africa is still recovering from the effects of the war, but she has discovered a new crop, which is likely to build a great prosperity for her in the near future. Cotton is still at a premium in the world's markets, and South Africa has found that it grows even better with her than on its native American soil. This year experimental plots are broadening out into big areas. The bush is being cleared, and the ploughs are working. To show how the cotton-lands have increased, it is only necessary to state that all the cotton-seed harvested last year will hardly suffice to plant the new lands. The Zoutpansberg is not behind. There has never been such ploughing done as this year's, and the acreage will go on increasing. England cannot understand great agricultural enthusiasms. The potentialities of the crops are known. But a new country like South Africa can be swept into excitement

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by a new crop. In the Zoutpansberg now you hear everywhere: "How much have you got ploughed?" "What variety are you planting?" etc., etc. Cotton has even ousted politics as a subject of conversation, and politics are dear to the heart of the South African.

Suppose we have accepted the hospitality of a farmer at the "back of the mountain." We will walk down to the lands. All arable land in South Africa is called "lands," and grazing land if fenced is called "camps," if unfenced "veldt." I can promise that we shall run across some sort of wild life, maybe a herd of ostriches, or a couple of bull koodoo or a jackal; certainly either a duiker or a steenbuck. I remember riding down the farm track one day, when a steenbuck crossed the road not 15 yards in front of me. He had obviously lost something, and was absent-mindedly nosing his way through the bush looking for it, for he did not notice me until he had crossed the road and I had ridden up behind him. Then consciousness awoke and he fled away into the bush, his red form bounding over the uneven ground. I drew up and watched in admiration of his gracefulness. To-day all we see is a duiker flashing away in the distance, and a herd of koodoo cows wandering through the bush. I never think them handsome animals, as they are too heavy, though it is marvellous how they can gallop noiselessly through the bush, where I can hardly move without awakening the echoes with snapping twigs. We come out onto the lands; and there goes the plough driving its way into the virgin soil, and the driver shouts and the whip whistles, and the oxen strain. What a scene of animation. Undoubtedly the niggers saw us coming. Energy of that sort is unnatural to the aboriginal, and is only manifested in the presence of the "baas."

In some ways South Africa does not change, and her allegiance to the ox as a beast of transport is one of them. As long as black labour is used, so long will the ox remain. There is some spiritual relationship between the ox and the Kaffir that makes them eminently suited to one another. And so you will see the old span of 16 oxen pulling the gang plough, and looking much the same as the ox-spans of the "voortrekkers." It is a typically South African sight. Some day perhaps the tractor will send the ox to the butcher but his time is not yet. It may not thrill the visitor to watch the

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ploughing in progress, but to the farmer, who is depending on the crop for everything, the plough conjures up the vision of a land white with cotton, and a fat cheque to come. There is many a slip in farming life, but often nature yields to the persistent farmer more than he expected, and the money enables him to realise some of his ambitions.

Returning through the bush we might notice some of the trees as we pass. None of the English trees grow here. They are all trees which do not mind the long rainless winter. September comes, and rain or no rain, the trees come into flower, and the leaves come, but the grass under them waits for the rain. The brown grass of the winter months, though still a good feed for cattle, is rather a depressing sight; but when the rain comes a week suffices for a heavy growth of vivid green, and the glorious change is worth waiting for. The names of South African trees do not convey much to an Englishman, as the names are all Dutch or Kaffir, but some are valuable timbers, and most of them are hard-woods which will withstand the ravages of time or hard wear, Many of the trees are interesting in their form of growth or flowering, such as the tree which grows on the mountain slopes and bears figs which actually grow on the main trunk, or another whose bark peels off like that of the silver birch, only in big sheets, which look like nothing so much as tracing paper, and which reveals a vivid green skin beneath. The outstanding tree of the district is the baobab. Its gigantic pulpy trunk throws out ridiculous branches at the top, and by driving hard-wood pegs into the bole you can make a ladder up to a safe retreat in case of being lost at nightfall.

If we visit one of our neighbours we shall see a variety of farming new to us. Nearly all the work is done by native "boys," and the farmer spends most of his time on such work as demands his personal attention. Repairs take a lot of his time. There are generally no blacksmiths or carpenters sufficiently near at hand to do small jobs, and the farmer does them himself. However, you will never find him too fully occupied to give a welcome to a visitor. Hospitality is an obligation which is sacred to every South African. He takes his visitors onto the "stoep" and there regales them with coffee, which is the national drink: and if he may be a little

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inquisitive about your affairs, he will be equally ready to tell you his. When we come home in the evening we find the best part of the day awaiting us. Nothing in my mind is more pleasant than the after-dinner hour in South Africa. The day's work is done, and we can sit out on the "stoep" and watch the moon rise through the bush, and listen to the shrilling of the crickets. The moon gives light enough to read, so we can see every bush and flower in the garden as clearly as in daylight, but the moon beautifies everything beyond expression: and if we hear the hyena laughing in the distance it only intensifies the feeling of peacefulness, when we think of the unceasing vigilance of the wild creatures in the bush. Nobody who has not experienced the South African evening hour has ever really rested.

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INDEX—VOLUME LII.

A.

Air Force and Army Co-operation. By Major R. G. Cherry, M.C., R.A. 548
Air Requirements of the Army; The. (A lecture). By Major-Genl. Sir W. E. Ironside, K.C.B., C.M.G., D.S.O. 18
Air, The Staff Officer in the. By Lt.-Col. F. A. Pile, D.S.O., M.C., Royal Tank Corps ... 417
Anstey, Bt. Lt.-Col. E. C., D.S.O., R.A. Artillery Brigade Tactical Exercises 396
Anstey, Bt. Lt.-Col. E. C., D.S.O., R.A. Artillery Brigade Tactical Exercises 524
Anstey, Bt. Lt.-Col. E. C., D.S.O., R.A. Artillery Tactical Problems 52
Anti-Aircraft Artillery. . . . . with reference to Moving Warfare. ("Duncan" Essay 1924-25). By Capt. K. M. Loch, M.C., R.A. 320
Appleton, Lieut. G. L., R.A. A Marching Problem 421
Appleton, Lieut. G. L., R.A. The Imperial Nerves and Arteries 92
Army, The; Air Requirements of. (A lecture). By Major-Genl. Sir W. E. Ironside, K.C.B., C.M.G., D.S.O. 18
Artillery, Anti-Aircraft. . . . . with reference to Moving Warfare. ("Duncan" Essay, 1924-25). By Capt. K. M. Loch, M.C., R.A. 320
Artillery Brigade Tactical Exercises. By Lt.-Col. E. C. Anstey, D.S.O., R.A. 396
Artillery Brigade Tactical Exercises. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. 524
Artillery, Close Support. By Pompey 193
Artillery, Employment of; F.S.R. Vol. II, 1924. By Major H. R. Pownall, D.S.O., M.C., R.A. 210
Artillery, Field: XLI Brigade 11th November, 1914. By Major A. F. Becke, late R.F.A. 149
Artillery (Medium) Territorial. The employment of Mechanical Transport by. By Bt. Colonel Edward V. Hemelryk, D.S.O., T.D. 87
Artillery, Pack—Present and Future. By Capt. H. M. J. McIntyre, R.A. 66
Artillery, Royal—War Memorial Unveiling and Dedication Ceremony. By Major-Genl. Sir Stanley von Donop, K.C.B., K.C.M.G., Col. Comdt., R.A. 465
Artillery, The Bombay Horse in Persia, and the Mutiny 1857-59. By Major-Genl. J. C. Dalton, Col. Comdt., R.A. 556
Artillery, The effect of Tactics on the Organisation and Command of. ("Duncan" Essay, 1924-25). By Bt. Lt.-Col. H. W. Wynter, D.S.O., R.H.A. 341
Artillery, The Evolution of in the Great War. By Bt. Lt.-Col. A. F. Brooke, D.S.O., *p.s.c.*, R.A. 37
Artillery, The Evolution of in the Great War. By Bt. Lt.-Col. A. F. Brooke, D.S.O., *p.s.c.*, R.A. 369
Artillery Tactics. By Lt.-Col. A. A. Goschen, D.S.O., R.A. 254
Artillery Tactical Problems. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. 52
Artillery, Territorial Field, Some problems of. By Major R. A. E. Voysey, R.A. (T.A.). 388
Assam, Tiger shooting in. By Capt. P. J. K. Warren, R.A. 431

B.

Battery Commander's Wagon, A. By Lieut. R. A. King, R.A. 110
Becke, Major A. F. late R.F.A. XLI R.F.A., Wednesday, 11th November, 1914. (With two maps.) 149
Blewitt, Capt. R., D.S.O., R.A. (T.A.). An Instructional Model 116
Bombay Horse Artillery in Persia, and the Indian Mutiny, 1857-59. By Major-Genl. J. C. Dalton, Col. Comdt., R.A. 556
Brooke, Bt. Lt.-Col. A. F., D.S.O., *p.s.c.*, R.A. The Evolution of Artillery in the Great War 37
Brooke, Bt. Lt.-Col. A. F., D.S.O., *p.s.c.*, R.A. The Evolution of Artillery in the Great War, IV. 369

C.

Cherry, Major R. G., M.C., R.A. Royal Air Force and Army Co-operation 548
Close Support Artillery. By Pompey 193
Co-operation, Army and Royal Air Force. By Major R. G. Cherry, M.C., R.A. 548
Counter-battery work in Mobile Warfare. ("Duncan" Essay, 1924-25). By Capt. R. H. A. Kellie, M.C., R.A. 490
Cressy, 1346; Our Cannon at the Battle of. By Lt.-Col. H. W. L. Hime, R.A. (Retired) 425

Digitized by Google

PAGE

D.

Dalton, Major-Genl. J. C., Col. Comdt., R.A. An Act of International Friendship. San Sebastian, 28th September, 1924 428
Dalton, Major-Genl. J. C., Col. Comdt., R.A. The Bombay Horse Artillery in Persia, and the Mutiny, 1857-59. 556
De Sausmarez, Colonel C., C.B., C.M.G., D.S.O. Pack or Single Draught 182
De Sausmarez, Brig.-Genl. C., C.B., C.M.G., D.S.O. The Stand at Le Cateau, 26th August, 1914 510
Draught, Pack or Single. By Colonel C. De Sausmarez, C.B., C.M.G., D.S.O. 182
"Duncan" Essays, 1924-25.
Anti-Aircraft Artillery . . . . with reference to Moving Warfare. By Capt. K. M. Loch, M.C., R.A. 320
Counter-battery Work in Mobile Warfare. By Capt. R. H. A. Kellie, M.C., R.A. ... 490
The Effect of Tactics on the Organisation and Command of Artillery. By Bt. Lt.-Col. H. W. Wynter, D.S.O., R.H.A. 341
The Supply, Training and Organisation of Technical Specialists. By Col. (temp. Col. Comdt.) M. L. Wilkinson 307

F.

Fane, Lieut. H. W., late R.A. There is a Happy Land 585
Fishing in India, an inexpensive trip. By Capt. A. Veitch, R.A. 144
Fuller, Colonel J. F. C., D.S.O. Tanks in Rear Guard Operations 261

G.

Goschen, Lt.-Col. A. A., D.S.O., R.A. Artillery Tactics 254
Great War, The Evolution of Artillery in the. By Bt. Lt.-Col. A. F. Brooke, D.S.O., *p.s.c.*, R.A. 37
Great War, The Evolution of Artillery in the. By Bt. Lt.-Col. A. F. Brooke, D.S.O., *p.s.c.*, R.A. 369

H.

Hemelryk, Bt. Colonel Edward V., D.S.O., T.D. The Employment of Mechanical Transport by Territorial Medium Artillery 87
Hime, Lt.-Col. H. W. L., R.A. (Retired). Our Cannon at the Battle of Cressy, 1346 425
Home—by the Overland Route. By Col. H. Rowan-Robinson, C.M.G., D.S.O. 443

I.

Imperial Nerves and Arteries, The. By Lieut. G. L. Appleton, R.A. 92
India, Fishing in, An inexpensive trip. By Capt. A. Veitch, R.A. 144
India, Sport in. By Major-Genl. E. H. Willis, C.B., C.M.G. 122
Intelligence in the Field, The role of forward troops in the collection of. (A lecture). By Major-Genl. Sir William Thwaites, K.C.M.G., C.B. 235
Intercepted Conversations. (With apologies to the Quarterly Artillery Summary). 118
International Friendship, An act of. San Sebastian, 28th September, 1924. By Maj.-Genl. J. C. Dalton, Col. Comdt., R.A. 428
Ironside, Maj.-Genl. Sir W. E., K.C.B., C.M.G., D.S.O. The Air Requirements of the Army. (A lecture) 18

K.

Kadir Cup Meeting, 1925. By Nemo 296
Kellie, Captain R. H. A., M.C., R.A. Counter-battery work in Mobile Warfare. ("Duncan" Essay, 1924-25) 490
King, Lieut. R. A., R.A. A Battery Commander's Wagon 110

L.

Le Cateau, The Stand at, 26th August, 1914. By Brig.-Genl. C. De Sausmarez, C.B., C.M.G., D.S.O. 510
Loch, Capt. K. M., M.C., R.A. Anti-Aircraft Artillery . . . . with reference to Moving Warfare. ("Duncan" Essay, 1924-25) 320

Digitized by Google

PAGE

M.

MacMunn, Major-Genl. Sir G. F., K.C.B., K.C.S.I., D.S.O. The Battle of Romani 1
MacMunn, Major-Genl. Sir G. F., K.C.B., K.C.S.I., D.S.O. The Story of the Sikhs and the recent troubles 561
Marching Problem, A. By Lieut. G. L. Appleton, R.A. 421
Mechanical Transport, The employment of by Territorial Medium Artillery. By Bt. Colonel Edward V. Hemelryk, D.S.O., T.D. 87
McIntyre, Capt. H. M. J., R.A. Pack Artillery—Present and Future 66
Mobile Warfare, Counter-battery work in. ("Duncan" Essay, 1924-25). By Capt. R. H. A. Kellie, M.C., R.A. 490
Model, An Instructional. By Capt. R. Blewitt, D.S.O., R.A. (T.A.) 116
Mount Everest, 1924. By Lieut.-Col. E. F. Norton, D.S.O., M.C., R.A. 270
Mountain Warfare, The Pack Gun in. By Colonel H. Rowan-Robinson, C.M.G., D.S.O. 365

N.

"Nemo." The Kadir Cup Meeting, 1925 296
Norton, Lieut.-Col. E. F., D.S.O., M.C., R.A. Mount Everest, 1924 270

O.

"O.B.E." Early Days in Rajputana 291
Ottoman Subjects, on. By Lt.-Col. C. B. Thackeray, D.S.O. 453
Overland Route from India. By Colonel H. Rowan-Robinson, C.M.G., D.S.O. 443

P.

Pack Artillery—Present and Future. By Capt. H. M. J. McIntyre, R.A. 66
Pack Gun in Mountain Warfare, The. By Colonel H. Rowan-Robinson, C.M.G., D.S.O. ... 365
Pack or Single Draught. By Colonel C. De Sausmarez, C.B., C.M.G., D.S.O. 182
Pile, Lt.-Col. F. A., D.S.O., M.C., Royal Tank Corps. The Problem of the Tank. (A lecture) 217
Pile, Lt.-Col. F. A., D.S.O., M.C., Royal Tank Corps. The Staff Officer in the Air. A Reply to Artillery Command from the Air 417
"Pompey." Close Support Artillery 193
Pownall, Major H. R., D.S.O., M.C., R.A. F.S.R. Vol. II, 1924—on the Employment of Artillery 210
Problem of the Tank, The. (A lecture). By Lt.-Col. F. A. Pile, D.S.O., M.C., Royal Tank Corps 217

R.

Rajputana, Early days in. By "O.B.E." 291
Rear Guard Operations, Tanks in. By Colonel J. F. C. Fuller, D.S.O. 261
Romani, The Battle of. By Major.-Genl. Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O. 1
Royal Artillery Mess, Woolwich, The .....Frontispiece and 305
Rowan-Robinson, Colonel H., C.M.G., D.S.O. Home—by the Overland Route 443
Rowan-Robinson, Colonel H., C.M.G., D.S.O. The Pack Gun in Mountain Warfare ... 365

S.

Staff Officer in the Air, The. By Lt.-Col. F. A. Pile, D.S.O., M.C., Royal Tank Corps ... 417
Sikhs, The Story of the, and the recent troubles. By Major-Genl. Sir G. F. MacMunn, K.C.B., K.C.S.I., D.S.O. 561
Sport in India. By Major-Genl. E. H. Willis, C.B., C.M.G. 122

T.

Tactical Exercises, Artillery Brigade. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. 396
Tactical Exercises, Artillery Brigade. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. ... 524
Tactical Problems, Artillery. By Bt. Lt.-Col. E. C. Anstey, D.S.O., R.A. 52
Tactics, Artillery. By Lt.-Col. A. A. Goschen, D.S.O., R.A. 254
Tactics, The effect of, on the Organisation and Command of Artillery. ("Duncan" Essay, 1924-25). By Bt. Lt.-Col. H. W. Wynter, D.S.O., R.H.A. 341
Tanks in Rear Guard Operations. By Colonel J. F. C. Fuller, D.S.O. 261
Tank, The Problem of the. (A lecture). By Lt.-Col. F. A. Pile, D.S.O., M.C., Royal Tank Corps 217

Digitized by Google

PAGE

Technical Specialists, The Supply, Training and Organisation of. ("Duncan" Essey, 1924-25). By Colonel (temp. Col. Comdt.) M. L. Wilkinson 307
Territorial Field Artillery, Some Problems of. By Major R. A. E. Voysey, R.A. (T.A.) 388
Thackeray, Lt.-Col. C. B., D.S.O. On Ottoman Subjects 453
Thwaites, Major-Genl. Sir William, K.C.M.G., C.B. The role of forward troops in the collection of intelligence in the Field. (A lecture). 235
Tiger Shooting in Assam. By Capt. P. J. K. Warren, R.A. 431
Transvaal, Northern—There is a Happy Land. By Lieut. H. W. Fane, late R.A. 585
Troops, The role of forward, in the collection of intelligence in the Field. (A lecture). By Major-Genl. Sir Williams Thwaites, K.C.M.G., C.B. 235

V.

Veitch, Capt. A., R.A. An inexpensive fishing trip in India 144
von Donop, Major-Genl. Sir Stanley, K.C.B., K.C.M.G., Col. Comdt., R.A. Royal Artillery War Memorial. Unveiling and Dedication Ceremony 465
Voysey, Major R. A. E., R.A. (T.A.). Some Problems of Territorial Field Artillery ... 388

W.

Wagon, A Battery Commander's. By Lieut. R. A. King, R.A. 110
War Memorial, Royal Artillery—Unveiling and Dedication Ceremony. By Major-Genl. Sir Stanley von Donop, K.C.B., K.C.M.G., Col. Comdt., R.A. 465
War of 1914—1918. XLI R.F.A., 11th November, 1914. By Major A. F. Becke, late R.F.A. 149
Warren, Capt. P. J. K., R.A. Tiger shooting in Assam 431
Wilkinson, Colonel (temp. Col. Comdt.) M. L. The Supply, Training and Organisation of Technical Specialists. ("Duncan" Essay, 1924-25) 307
Willis, Major-Genl. E. H., C.B., C.M.G. Sport in India 122
Wynter, Bt. Lt.-Col. H. W., D.S.O., R.H.A. The effect of Tactics on the Organisation and Command of Artillery. ("Duncan" Essay, 1924-25) 341

END OF VOLUME LII.

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VOL. LII., No. 1. APRIL, 1925.

V. 52
Apr. 1925 - Jan 1926

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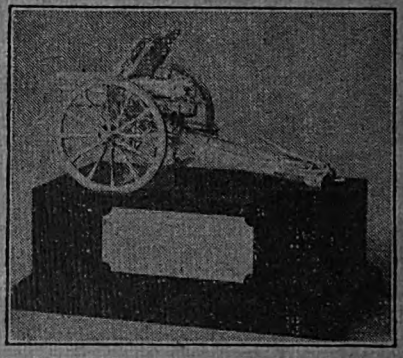

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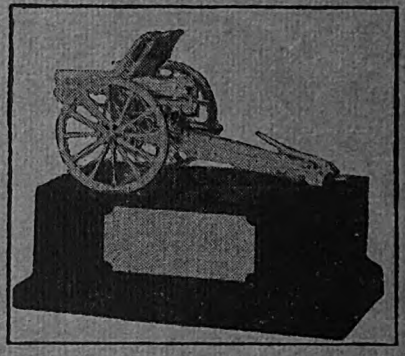

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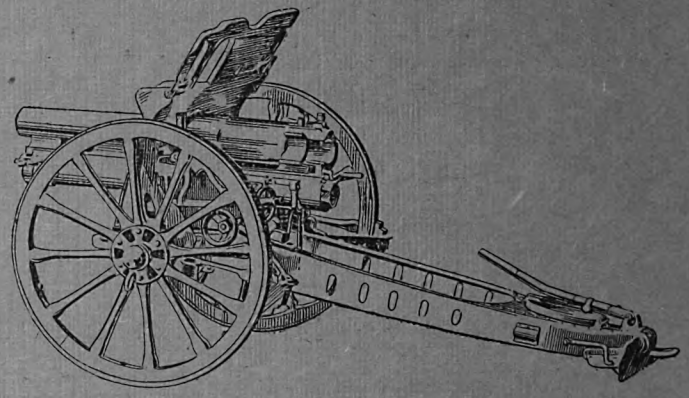

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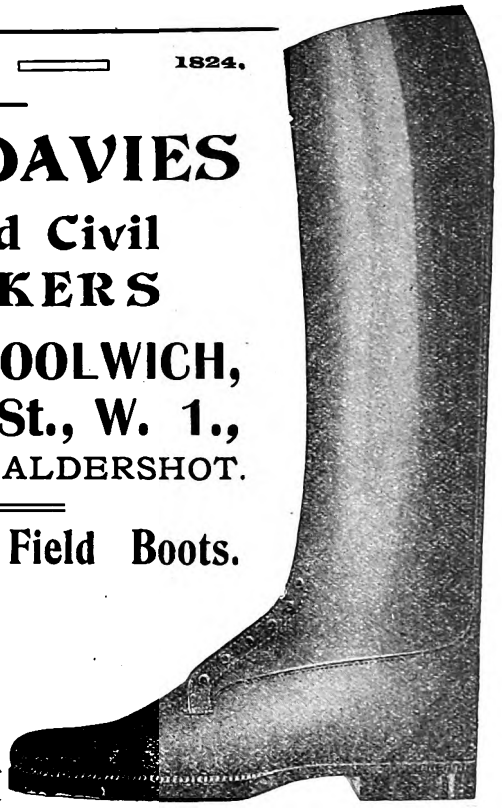

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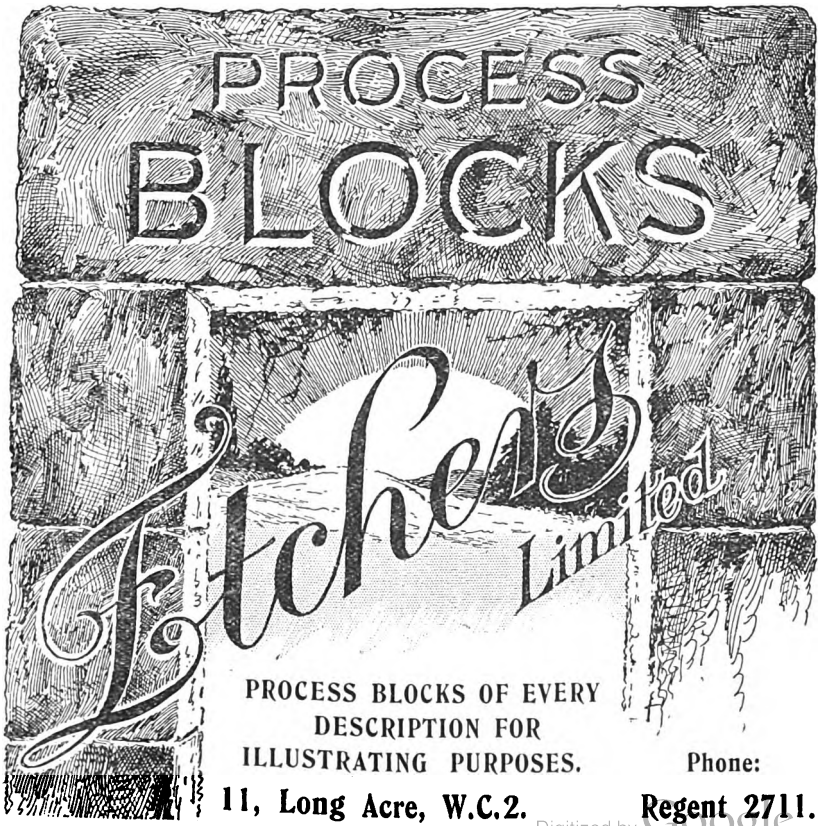

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Contents:

Page

Royal Artillery War Memorial. Unveiling and Dedication Ceremony. By Major-Genl. Sir Stanley von Donop, K.C.B., K.C.M.G., Colonel Commandant, R.A. 465

"Duncan" Essay, 1924-25. Counter-Battery Work in Mobile Warfare. By Captain R. H. A. Kellie, M.C., R.A. "Bis dat qui cito dat." 490

The Stand at Le Cateau, 26th August, 1924. By Brig.-General C. De Sausmarez, C.B., C.M.G., D.S.O. 510

Artillery Brigade Tactical Exercises. By Bt. Lieut.-Colonel E. C. Anstey, D.S.O., R.A. 524

Royal Air Force and Army Co-operation. By Major R. G. Cherry, M.C.. R.A. 548

The Bombay Horse Artillery in Persia, and the Mutiny, 1857-59. With a photograph of the survivors of the Officers of the Fourth Troop taken in 1911. By Major-General J. C. Dalton, Colonel Commandant, R.A. 556

The story of the Sikhs and the recent troubles. By Major-General Sir G. F. MacMunn, K.C.B., K.C.S.I.. D.S.O. 561

"There is a Happy Land . . . ." By Lieut. H. W. Fane, late R.A. 585

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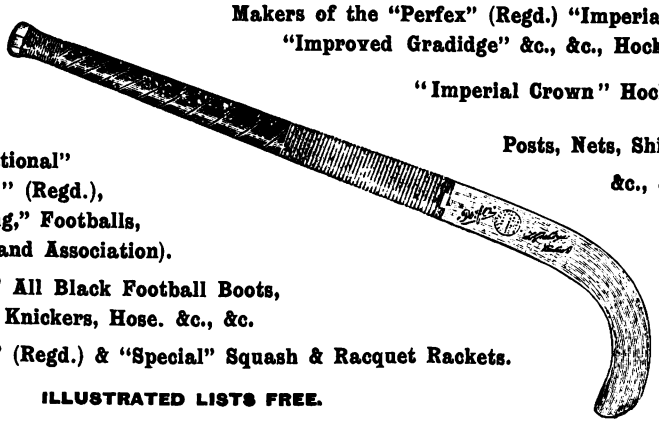

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